

References

- Abraham, R., and Robbin, J. 1967. *Transversal mapping and flows*. W. A. Benjamin.
- Aceña, A. 2009. Convergent null data expansions at spacelike infinity of stationary vacuum solutions. *Ann. Henri Poincaré*, **10**, 275.
- Aceña, A., and Valiente Kroon, J. A. 2011. Conformal extensions for stationary spacetimes. *Class. Quantum Grav.*, **28**, 225023.
- Alcubierre, M. 2008. *Introduction to 3+1 numerical relativity*. Oxford University Press.
- Ambrosetti, A., and Prodi, G. 1995. *A primer of nonlinear analysis*. Cambridge University Press.
- Anderson, M. T. 2000. On stationary vacuum solutions to the Einstein equations. *Ann. Henri Poincaré* **1**, 977.
- Anderson, M. T. 2005a. Existence and stability of even dimensional asymptotically de Sitter spaces. *Ann. Henri Poincaré*, **6**, 801.
- Anderson, M. T. 2005b. Geometric aspects of the AdS/CFT correspondence. Page 1 of: Biquard, O. (ed), *AdS/CFT correspondence: Einstein metrics and their conformal boundaries*. Euro. Math. Soc. Zürich.
- Anderson, M. T. 2006. On the uniqueness and global dynamics of AdS spacetimes. *Class. Quantum Grav.*, **23**, 6935.
- Anderson, M. T., and Chruściel, P. T. 2005. Asymptotically simple solutions of the vacuum Einstein equations in even dimensions. *Comm. Math. Phys.*, **260**, 557.
- Anderson, M. T., Chruściel, P. T., and Delay, E. 2002. Non-trivial static, geodesically complete vacuum spacetimes with a negative cosmological constant. *JHEP*, **10**, 6.
- Andersson, L. 2006. On the relation between mathematical and numerical relativity. *Class. Quantum Grav.*, **23**, S307.
- Andersson, L., and Chruściel, P. T. 1993. Hyperboloidal Cauchy data for vacuum Einstein equations and obstructions to smoothness of null infinity. *Phys. Rev. Lett.*, **70**, 2829.
- Andersson, L., and Chruściel, P. T. 1994. On “hyperboloidal” Cauchy data for vacuum Einstein equations and obstructions to smoothness of scri. *Comm. Math. Phys.*, **161**, 533.
- Andersson, L., Chruściel, P. T., and Friedrich, H. 1992. On the regularity of solutions to the Yamabe equation and the existence of smooth hyperboloidal initial data for Einstein’s field equations. *Comm. Math. Phys.*, **149**, 587.
- Anguige, K., and Tod, K. P. 1999a. Isotropic cosmological singularities I. Polytropic perfect fluid spacetimes. *Ann. Phys.*, **276**, 257.
- Anguige, K., and Tod, K. P. 1999b. Isotropic cosmological singularities II. The Einstein-Vlasov system. *Ann. Phys.*, **276**, 294.
- Appel, W. 2007. *Mathematics for physics and physicists*. Princeton University Press.
- Arnowitt, R., Deser, S., and Misner, C. W. 1962. The dynamics of general relativity. Page 227 of: Witten, L. (ed), *Gravitation: an introduction to current research*. John Wiley & Sons.

- Arnowitt, R., Deser, S., and Misner, C. 2008. Reprint of: The dynamics of general relativity. *Gen. Rel. Grav.*, **40**, 1997.
- Ashtekar, A. 1980. Asymptotic structure of the gravitational field at spatial infinity. Page 37 of: Held, A. (ed), *General relativity and gravitation: one hundred years after the birth of Albert Einstein*, vol. 2. Plenum Press.
- Ashtekar, A. 1984. Asymptotic properties of isolated systems: recent developments. Page 37 of: Bertotti, B., de Felice, F., and Pascolini, A. (eds), *General relativity and gravitation*. D. Reidel Publishing Company.
- Ashtekar, A. 1987. *Asymptotic quantization*. Bibliopolis.
- Ashtekar, A. 1991. *Lectures on non-perturbative canonical gravity*. World Scientific.
- Ashtekar, A. 2014. Geometry and physics of null infinity. Page 99 of: Bieri, L., and Yau, S.-T. (eds), *One hundred years of general relativity*. Surveys in Differential Geometry, vol. 20. International Press.
- Ashtekar, A., and Das, S. 2000. Asymptotically anti-de Sitter spacetimes: conserved quantities. *Class. Quantum Grav.*, **17**, L17.
- Ashtekar, A., and Dray, T. 1981. On the existence of solutions to Einstein's field equations with non-zero Bondi news. *Comm. Math. Phys.*, **79**, 581.
- Ashtekar, A., and Hansen, R. O. 1978. A unified treatment of null and spatial infinity in general relativity. I. Universal structure, asymptotic symmetries, and conserved quantities at spatial infinity. *J. Math. Phys.*, **19**, 1542.
- Ashtekar, A., and Magnon, A. 1984. Asymptotically anti-de Sitter space-times. *Class. Quantum Grav.*, **1**, L39.
- Ashtekar, A., and Schmidt, B. G. 1980. Null infinity and Killing fields. *J. Math. Phys.*, **21**, 862.
- Ashtekar, A., and Xanthopoulos, B. C. 1978. Isometries compatible with asymptotic flatness at null infinity: a complete description. *J. Math. Phys.*, **19**, 2216.
- Ashtekar, A., Horowitz, G. T., and Magnon-Ashtekar, A. 1982. A generalization of tensor calculus and its applications to physics. *Gen. Rel. Grav.*, **14**, 411.
- Aubin, T. 1976. Équations différentielles non linéaires et le problème de Yamabe concernant la courbure scalaire. *J. Math. Pures Appl.*, **55**, 269.
- Bäckdahl, T. 2007. Axisymmetric stationary solutions with arbitrary multipole moments. *Class. Quantum Grav.*, **24**, 2205.
- Bäckdahl, T. 2009. Relating the Newman-Penrose constants to the Geroch-Hansen multipole moments. *Class. Quantum Grav.*, **26**, 231102.
- Bäckdahl, T., and Herberthson, M. 2005a. Explicit multipole moments of stationary axisymmetric spacetimes. *Class. Quantum Grav.*, **22**, 3585.
- Bäckdahl, T., and Herberthson, M. 2005b. Static axisymmetric space-times with prescribed multipole moments. *Class. Quantum Grav.*, **22**, 1607.
- Bäckdahl, T., and Herberthson, M. 2006. Calculations of, and bounds for, the multipole moments of stationary spacetimes. *Class. Quantum Grav.*, **23**, 5997.
- Bäckdahl, T., and Valiente Kroon, J. A. 2010a. Geometric invariant measuring the deviation from Kerr data. *Phys. Rev. Lett.*, **104**, 231102.
- Bäckdahl, T., and Valiente Kroon, J. A. 2010b. On the construction of a geometric invariant measuring the deviation from Kerr data. *Ann. Henri Poincaré*, **11**, 1225.
- Bartnik, R. 1986. The mass of an asymptotically flat manifold. *Comm. Pure Appl. Math.*, 661.
- Bartnik, R., and Isenberg, J. 2004. The constraint equations. Page 1 of: Chruściel, P. T., and Friedrich, H. (eds), *The Einstein equations and the large scale behaviour of gravitational fields*. Birkhauser.
- Baston, R. J., and Mason, L. J. 1987. Conformal gravity, the Einstein equation and spaces of complex null geodesics. *Class. Quantum Grav.*, **4**, 815.

- Baumgarte, T. W., and Shapiro, S. L. 2010. *Numerical relativity: solving Einstein's equations on the computer*. Cambridge University Press.
- Beig, R. 1984. Integration of Einstein's equations near spatial infinity. *Proc. Roy. Soc. Lond. A*, **391**, 295.
- Beig, R. 1985. A remarkable property of spherical harmonics. *J. Math. Phys.*, **26**, 769.
- Beig, R. 1991. Conformal properties of static spacetimes. *Class. Quantum Grav.*, **8**, 263.
- Beig, R., and Heinzle, J. M. 2005. CMC-slicings of Kottler-Schwarzschild-de Sitter Cosmologies. *Comm. Math. Phys.*, **260**, 673.
- Beig, R., and Husa, S. 1994. Initial data for general relativity with toroidal conformal symmetry. *Phys. Rev. D*, **50**, R7116.
- Beig, R., and O'Murchadha, N. 1991. Trapped surfaces due to concentration of gravitational radiation. *Phys. Rev. Lett.*, **66**, 2421.
- Beig, R., and O'Murchadha, N. 1994. Trapped surfaces in vacuum spacetimes. *Class. Quantum Grav.*, **11**, 419.
- Beig, R., and O'Murchadha, N. 1996. The momentum constraints of general relativity and spatial conformal isometries. *Comm. Math. Phys.*, **176**, 723.
- Beig, R., and O'Murchadha, N. 1998. Late time behaviour of the maximal slicing of the Schwarzschild black hole. *Phys. Rev. D*, **57**, 4728.
- Beig, R., and Schmidt, B. G. 1982. Einstein's equation near spatial infinity. *Comm. Math. Phys.*, **87**, 65.
- Beig, R., and Schmidt, B. G. 2000. Time-independent gravitational fields. Page 325 of: Schmidt, B. G. (ed), *Einstein's field equations and their physical implications*. Springer.
- Beig, R., and Simon, W. 1980a. Proof of a multipole conjecture due to Geroch. *Comm. Math. Phys.*, **75**, 79.
- Beig, R., and Simon, W. 1980b. The stationary gravitational field near spatial infinity. *Gen. Rel. Grav.*, **12**, 1003.
- Beig, R., and Simon, W. 1981. On the multipole expansions for stationary space-times. *Proc. Roy. Soc. Lond. A*, **376**, 333.
- Beig, R., and Szabados, L. B. 1997. On a global invariant of initial data sets. *Class. Quantum Grav.*, **14**, 3091.
- Bekenstein, J. 1974. Exact solutions of Einstein-conformal scalar equations. *Ann. Phys.*, **82**, 535.
- Bernal, A. N., and Sánchez, M. 2007. Globally hyperbolic spacetimes can be defined as 'causal' instead of strongly causal. *Class. Quantum Grav.*, **24**, 745.
- Besse, A. L. 2008. *Einstein manifolds*. Springer Verlag.
- Beyer, F. 2007. Asymptotics and singularities in cosmological models with positive cosmological constant. PhD thesis, University of Potsdam.
- Beyer, F. 2008. Investigations of solutions of Einstein's field equations close to lambda-Taub-NUT. *Class. Quantum Grav.*, **25**, 235005.
- Beyer, F. 2009a. Non-genericity of the Nariai solutions: I. Asymptotics and spatially homogeneous perturbations. *Class. Quantum Grav.*, **26**, 235015.
- Beyer, F. 2009b. Non-genericity of the Nariai solutions: II. Investigations within the Gowdy class. *Class. Quantum Grav.*, **26**, 235016.
- Beyer, F. 2009c. A spectral solver for evolution problems with spatial S3-topology. *J. Comput. Phys.*, **228**, 6496.
- Beyer, F., Doulis, G., Frauendiener, J., and Whale, B. 2012. Numerical space-times near space-like and null infinity. The spin-2 system on Minkowski space. *Class. Quantum Grav.*, **29**, 245013.

- Bičák, J. 2000. Selected solutions of Einstein's field equations: their role in general relativity and astrophysics. In: Schmidt, B. G. (ed), *Einstein field equations and their physical implications (selected essays in honour of Juergen Ehlers)*. Springer Verlag.
- Bičák, J., and Krtouš, P. 2001. Accelerated sources in de Sitter spacetime and the insufficiency of retarded fields. *Phys. Rev. D*, **64**, 124020.
- Bičák, J., and Krtouš, P. 2002. The fields of uniformly accelerated charges in de Sitter spacetime. *Phys. Rev. Lett.*, **88**, 211101.
- Bičák, J., and Schmidt, B. G. 1989. Asymptotically flat radiative space-times with boost-rotation symmetry: the general structure. *Phys. Rev. D*, **40**, 1827.
- Bičák, J., Scholtz, M., and Tod, K. P. 2010. On asymptotically flat solutions of Einstein's equations periodic in time: II. Spacetimes with scalar-field sources. *Class. Quantum Grav.*, **27**, 175011.
- Bizon, P. 2013. Is AdS stable? *Gen. Rel. Grav.*, **46**, 1724.
- Bizon, P., and Friedrich, H. 2012. A remark about wave equations on the extreme Reissner-Nordström black hole exterior. *Class. Quantum Grav.*, **30**, 065001.
- Bizon, P., and Rostworowski, A. 2011. Weakly turbulent instability of anti-de Sitter spacetime. *Phys. Rev. Lett.*, **107**, 031102.
- Bondi, H., van der Burg, M. G. J., and Metzner, A. W. K. 1962. Gravitational waves in general relativity VII. Waves from axi-symmetric isolated systems. *Proc. Roy. Soc. Lond. A*, **269**, 21.
- Brännlund, J. 2004. Conformal isometry of the Reissner-Nordström-de Sitter Black Hole. *Gen. Rel. Grav.*, **36**, 883.
- Branson, T., Eastwood, M., and Wang, M. 2004. Conformal geometry. In www.birs.ca/workshops/2004/04w5006/report04w5006.pdf.
- Brill, D.R., and Hayward, S. A. 1994. Global structure of a black hole cosmos and its extremes. *Class. Quantum Grav.*, **11**, 359.
- Buchdahl, H. A. 1959. Reciprocal static metrics and scalar fields in the general theory of relativity. *Phys. Rev.*, **115**, 1325.
- Butscher, A. 2002. Exploring the conformal constraint equations. Page 195 of: Frauendiener, J., and Friedrich, H. (eds), *The conformal structure of spacetime: geometry, analysis, numerics*. Lect. Notes. Phys. Springer.
- Butscher, A. 2007. Perturbative solutions of the extended constraint equations in general relativity. *Comm. Math. Phys.*, **272**, 1.
- Cagnac, F. 1981. Problème de Cauchy sur un cône caractéristique pour des équations quasi-linéaires. *Ann. Mat. Pure Appl.*, **129**, 13.
- Carmeli, M. 1977. *Group theory and general relativity: representations of the Lorentz group and their applications to the gravitational field*. McGraw-Hill.
- Carter, B. 1966a. The complete analytic extension of the Reissner-Nordström metric in the special case $e^2 = m^2$. *Phys. Rev. Lett.*, **21**, 423.
- Carter, B. 1966b. Complete analytic extension of the symmetry axis of Kerr's solution of Einstein's equations. *Phys. Rev.*, **141**, 1242.
- Carter, B. 1968. Global structure of the Kerr family of gravitational fields. *Phys. Rev.*, **174**, 1559.
- Carter, B. 1971. Causal structure in space-time. *Gen. Rel. Grav.*, **1**, 349.
- Carter, B. 1973. Black hole equilibrium states. Page 61 of: DeWitt, C., and DeWitt, B.S. (eds), *Black holes: les astres occlus*. Gordon and Breach.
- Chaljub-Simon, A. 1982. Decomposition of the space of covariant two-tensors on \mathbb{R}^3 . *Gen. Rel. Grav.*, **14**, 743.

- Chaljub-Simon, A., and Choquet-Bruhat, Y. 1980. Global solutions of the Licherowicz equation in general relativity on an asymptotically Euclidean manifold. *Gen. Rel. Grav.*, **12**, 175.
- Chang, S.-Y. A., Qing, J., and Yang, P. 2007. Some progress in conformal geometry. *Sigma*, **3**, 122.
- Choptuik, M. W. 1993. Universality and scaling in gravitational collapse of a massless scalar field. *Phys. Rev. Lett.*, **70**, 9.
- Choquet-Bruhat, I., Isenberg, J., and York, J. W. Jr. 2000. Einstein constraints on asymptotically Euclidean manifolds. *Phys. Rev. D*, **61**, 084034.
- Choquet-Bruhat, Y. 2007. Results and open problems in mathematical general relativity. *Milan J. Math.*, **75**, 273.
- Choquet-Bruhat, Y. 2008. *General relativity and the Einstein equations*. Oxford University Press.
- Choquet-Bruhat, Y., and Christodoulou, D. 1981. Existence of global solutions of the Yang-Mills, Higgs and spinor field equations in 3+1 dimensions. *Ann. Sci. l'E.N.S.*, **14**, 481.
- Choquet-Bruhat, Y., and Geroch, R. 1969. Global aspects of the Cauchy problem in general relativity. *Comm. Math. Phys.*, **14**, 329.
- Choquet-Bruhat, Y., and York, J. W. Jr. 1980. The Cauchy problem. In: Held, A. (ed), *General relativity and gravitation*, Vol. I. Plenum Press.
- Choquet-Bruhat, Y., Dewitt-Morette, C., and Dillard-Bleek, M. 1982. *Analysis, manifolds and physics: part I*. North Holland Publishing Company.
- Choquet-Bruhat, Y., Chruściel, P. T., and Martín-García, J. M. 2011. The Cauchy problem on a characteristic cone for the Einstein equations in arbitrary dimensions. *Ann. Henri Poincaré*, **12**, 419.
- Christodoulou, D. 1986. The problem of a self-gravitating scalar field. *Comm. Math. Phys.*, **105**, 337.
- Christodoulou, D., and Klainerman, S. 1993. *The global nonlinear stability of the Minkowski space*. Princeton University Press.
- Christodoulou, D., and O'Murchadha, N. 1981. The boost problem in general relativity. *Comm. Math. Phys.*, **80**, 271.
- Chruściel, P. T. 1991. *On the uniqueness in the large of solutions of Einstein's equations ("Strong Cosmic Censorship")*. Centre for Mathematics and Its Applications, Australian National University.
- Chruściel, P. T., and Delay, E. 2002. Existence of non-trivial, vacuum, asymptotically simple spacetimes. *Class. Quantum Grav.*, **19**, L71.
- Chruściel, P. T., and Delay, E. 2003. On mapping properties of the general relativistic constraint operator in weighted function spaces, with applications. *Mem. Soc. Math. France*, **94**, 1.
- Chruściel, P. T., and Delay, E. 2009. Gluing constructions for asymptotically hyperbolic manifolds with constant scalar curvature. *Comm. Anal. Geom.*, **17**, 343.
- Chruściel, P. T., and Paetz, T.-T. 2012. The many ways of the characteristic Cauchy problem. *Class. Quantum Grav.*, **29**, 145006.
- Chruściel, P. T., and Paetz, T.-T. 2013. Solutions of the vacuum Einstein equations with initial data on past null infinity. *Class. Quantum Grav.*, **30**, 235037.
- Chruściel, P. T., MacCallum, M. A. H., and Singleton, D. B. 1995. Gravitational waves in general relativity XIV. Bondi expansions and the "polyhomogeneity" of \mathcal{I} . *Phil. Trans. Roy. Soc. Lond. A*, **350**, 113.
- Chruściel, P. T., Ölz, C. R., and Szybka, S. J. 2012a. Space-time diagrammatics. *Phys. Rev. D*, **86**, 124041.

- Chruściel, P. T., and Costa, J. L., and Heusler, M. 2012b. Stationary black holes: uniqueness and beyond. *Living Rev. Relativity* **15**, 7. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2012-7.
- Cocke, W. J. 1989. Table for constructing spin coefficients in general relativity. *Phys. Rev. D*, **40**, 650.
- Cook, G. B. 2000. Initial data for numerical relativity. *Living Rev. Relativity*, **3**, 5. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2000-5.
- Corvino, J. 2000. Scalar curvature deformations and a gluing construction for the Einstein constraint equations. *Comm. Math. Phys.*, **214**, 137.
- Corvino, J. 2007. On the existence and stability of the Penrose compactification. *Ann. Henri Poincaré*, **8**, 597.
- Corvino, J., and Schoen, R. 2006. On the asymptotics for the Einstein constraint vacuum equations. *J. Diff. Geom.*, **73**, 185.
- Cotton, É. 1899. Sur les variétés à trois dimensions. *Ann. Fac. Sci. Toulouse 2e série*, **1**, 385.
- Couch, W. E., and Torrence, R. J. 1984. Conformal invariance under spatial inversion of extreme Reissner-Nordström black holes. *Gen. Rel. Grav.*, **16**, 789.
- Courant, R., and Hilbert, D. 1962. *Methods of mathematical physics*. Vol. II. John Wiley & Sons.
- Courant, R., and John, F. 1989. *Introduction to calculus and analysis II/1*. Springer.
- Cutler, C. 1989. Properties of spacetimes that are asymptotically flat at timelike infinity. *Class. Quantum Grav.*, **6**, 1075.
- Cutler, C., and Wald, R. M. 1989. Existence of radiating Einstein-Maxwell solutions which are C^∞ on all of \mathcal{I}^+ and \mathcal{I}^- . *Class. Quantum Grav.*, **6**, 453.
- Dafermos, M. 2003. Stability and instability of the Cauchy horizon for the spherically symmetric Einstein-Maxwell-scalar field equations. *Ann. Math.*, **158**, 875.
- Dafermos, M. 2005. The interior of charged black holes and the problem of uniqueness in general relativity. *Comm. Pure Appl. Math.*, **58**, 0445.
- Dafermos, M., and Rodnianski, I. 2005. A proof of Price's law for the collapse of a self-gravitating scalar field. *Invent. Math.*, **162**, 381.
- Dafermos, M., and Rodnianski, I. 2010. Lectures on black holes and linear waves. Page 97 of: Ellwood, D., Rodnianski, I., Staffilani, G., and Wunsch, J. (eds), *Evolution equations*. Clay Mathematics Proceedings, Vol. 17. American Mathematical Society-Clay Mathematics Institute.
- Dain, S. 2001a. Initial data for a head-on collision of two Kerr-like black holes with close limit. *Phys. Rev. D*, **64**, 124002.
- Dain, S. 2001b. Initial data for stationary spacetimes near spacelike infinity. *Class. Quantum Grav.*, **18**, 4329.
- Dain, S. 2001c. Initial data for two Kerr-like black holes. *Phys. Rev. Lett.*, **87**, 121102.
- Dain, S. 2006. Elliptic systems. Page 117 of: Frauendiener, J., Giulini, D., and Perlick, V. (eds), *Analytical and numerical approaches to general relativity*. Lect. Notes. Phys., vol. 692. Springer Verlag.
- Dain, S., and Friedrich, H. 2001. Asymptotically flat initial data with prescribed regularity at infinity. *Comm. Math. Phys.*, **222**, 569.
- Dain, S., and Gabach-Clement, M. E. 2011. Small deformations of extreme Kerr black hole initial data. *Class. Quantum Grav.*, **28**, 075003.
- Damour, T., and Schmidt, B. 1990. Reliability of perturbation theory in general relativity. *J. Math. Phys.*, **31**, 2441.
- Dossa, M. 1986. Solution globale d'un problème de Cauchy caractéristique non linéaire. *Comptes Rendus de l'Academie des Sciences. Series I*, **303**, 795.

- Dossa, M. 1997. Espaces de Sobolev non isotropes à poids et problèmes de Cauchy quasi-linéaires sur un cône caractéristique. *Ann. Inst. H. Poincaré Phys. Théor.*, **1**, 37.
- Dossa, M. 2002. Solutions C^∞ d'une classe de problèmes de Cauchy quasi-linéaires hyperboliques du second ordre sur un cône caractéristique. *Annales de la faculté des sciences de Toulouse Sér. 6*, **11**, 351.
- Eastwood, M. 1996. Notes on conformal differential geometry. Page 57 of: Slovák, J. (ed), *Proceedings of the 15th Winter School "Geometry and Physics"*. Rendiconti del Circolo Matematico di Palermo, Serie II, vol. Supplemento No. 43. Circolo Matematico di Palermo.
- Ehlers, J. 1973. Spherically symmetric spacetimes. Page 114 of: Israel, W. (ed), *Relativity, astrophysics and cosmology*. D. Reidel Publishing Company.
- Ellis, G. F. R. 1984. Relativistic cosmology: its nature, aims and problems. In: Bertotti, B., de Felice, F., and Pascolini, A. (eds), *General relativity and gravitation*. D. Reidel Publishing Company.
- Ellis, G. F. R. 2002. The state of cosmology 2001: two views and a middle way. In: Bishop, N. T., and Maharaj, S. D. (eds), *General relativity and gravitation*. World Scientific.
- Ellis, G. F. R., and van Elst, H. 1998. Cosmological models: Cargèse lectures 1998. *NATO Adv. Study Inst. Ser. C. Math. Phys. Sci.*, **541**, 1.
- Ellis, G. F. R., Maartens, R., and MacCallum, M. A. H. 2012. *Relativistic cosmology*. Cambridge University Press.
- Estabrook, F., Wahlquist, H., Christensen, S., DeWitt, B., Smarr, L., and Tsiang, E. 1973. Maximally slicing a black hole. *Phys. Rev. D*, **7**, 2814.
- Evans, L. C. 1998. *Partial differential equations*. American Mathematical Society.
- Extor, A. R., Newman, E. T., and Penrose, R. 1969. Conserved quantities in the Einstein-Maxwell theory. *J. Math. Phys.*, **10**, 1566.
- Fefferman, C., and Graham, C. R. 1985. Page 95 of: *Élie Cartan et les mathématiques d'aujourd'hui. The mathematical heritage of Élie Cartan, Sémin. Lyon 1984*. Astérisque, No. Hors Sér.
- Fefferman, C., and Graham, C. R. 2012. *The ambient metric*. Annals of Mathematical Studies, vol. 178. Princeton University Press.
- Fischer, A. E., and Marsden, J. E. 1972. The Einstein evolution equations as a first-order quasi-linear symmetric hyperbolic system. I. *Comm. Math. Phys.*, **28**, 1.
- Fourès-Bruhat, Y. 1952. Théorème d'existence pour certains systèmes d'équations aux dérivées partielles non linéaires. *Acta Mathematica*, **88**, 141.
- Frances, C. 2005. The conformal boundary of anti de Sitter spacetimes. Page 205 of: Biquard, O. (ed), *AdS/CFT correspondence: Einstein metrics and their conformal boundaries*. Euro. Math. Soc. Zürich.
- Frankel, T. 2003. *The geometry of physics*. Cambridge University Press.
- Frauenhauer, J. 1998a. Numerical treatment of the hyperboloidal initial value problem for the vacuum Einstein equations. I. The conformal field equations. *Phys. Rev. D*, **58**, 064002.
- Frauenhauer, J. 1998b. Numerical treatment of the hyperboloidal initial value problem for the vacuum Einstein equations. II. The evolution equations. *Phys. Rev. D*, **58**, 064003.
- Frauenhauer, J. 2002. Some aspects of the numerical treatment of the conformal field equations. Page 261 of: Frauenhauer, J., and Friedrich, H. (eds), *The conformal structure of space-time: geometry, analysis, numerics*. Springer.
- Frauenhauer, J. 2004. Conformal infinity. *Living Rev. Relativity*, **7**, 1. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2004-1.

- Frauenhofer, J., and Hein, M. 2002. Numerical evolution of axisymmetric, isolated systems in general relativity. *Phys. Rev. D*, **66**, 124004.
- Frauenhofer, J., and Hennig, J. 2014. Fully pseudospectral solution of the conformally invariant wave equation near the cylinder at spacelike infinity. *Class. Quantum Grav.*, **31**, 085010.
- Frauenhofer, J., and Sparling, G. A. 2000. Local twistors and the conformal field equations. *J. Math. Phys.*, **41**, 437.
- Frauenhofer, J., and Szabados, L. B. 2001. The kernel of the edth operators on higher-genus spacelike 2-surfaces. *Class. Quantum Grav.*, **18**, 1003.
- Friedrich, H. 1981a. The asymptotic characteristic initial value problem for Einstein's vacuum field equations as an initial value problem for a first-order quasilinear symmetric hyperbolic system. *Proc. Roy. Soc. Lond. A*, **378**, 401.
- Friedrich, H. 1981b. On the regular and the asymptotic characteristic initial value problem for Einstein's vacuum field equations. *Proc. Roy. Soc. Lond. A*, **375**, 169.
- Friedrich, H. 1982. On the existence of analytic null asymptotically flat solutions of Einstein's vacuum field equations. *Proc. Roy. Soc. Lond. A*, **381**, 361.
- Friedrich, H. 1983. Cauchy problems for the conformal vacuum field equations in General Relativity. *Comm. Math. Phys.*, **91**, 445.
- Friedrich, H. 1984. Some (con-)formal properties of Einstein's field equations and consequences. In: Flaherty, F. J. (ed), *Asymptotic behaviour of mass and spacetime geometry*. Lecture notes in physics 202. Springer Verlag.
- Friedrich, H. 1985. On the hyperbolicity of Einstein's and other gauge field equations. *Comm. Math. Phys.*, **100**, 525.
- Friedrich, H. 1986a. Existence and structure of past asymptotically simple solutions of Einstein's field equations with positive cosmological constant. *J. Geom. Phys.*, **3**, 101.
- Friedrich, H. 1986b. On the existence of n-geodesically complete or future complete solutions of Einstein's field equations with smooth asymptotic structure. *Comm. Math. Phys.*, **107**, 587.
- Friedrich, H. 1986c. On purely radiative space-times. *Comm. Math. Phys.*, **103**, 35.
- Friedrich, H. 1988. On static and radiative space-times. *Comm. Math. Phys.*, **119**, 51.
- Friedrich, H. 1991. On the global existence and the asymptotic behaviour of solutions to the Einstein-Maxwell-Yang-Mills equations. *J. Diff. Geom.*, **34**, 275.
- Friedrich, H. 1992. Asymptotic structure of space-time. Page 147 of: Janis, A. I., and Porter, J. R. (eds), *Recent advances in general relativity*. Einstein Studies, vol. 4. Birkhauser.
- Friedrich, H. 1995. Einstein equations and conformal structure: existence of anti-de Sitter-type space-times. *J. Geom. Phys.*, **17**, 125.
- Friedrich, H. 1996. Hyperbolic reductions for Einstein's equations. *Class. Quantum Grav.*, **13**, 1451.
- Friedrich, H. 1998a. Einstein's equation and geometric asymptotics. Page 153 of: Dadhich, N., and Narlinkar, J. (eds), *Proceedings of the GR-15 conference*. Inter-University Centre for Astronomy and Astrophysics.
- Friedrich, H. 1998b. Evolution equations for gravitating ideal fluid bodies in general relativity. *Phys. Rev. D*, **57**, 2317.
- Friedrich, H. 1998c. Gravitational fields near space-like and null infinity. *J. Geom. Phys.*, **24**, 83.
- Friedrich, H. 1999. Einstein's equation and conformal structure. Page 81 of: Huggett, S. A., Mason, L. J., Tod, K. P., Tsou, S. T., and Woodhouse, N. M. J. (eds), *The geometric universe: science, geometry and the work of Roger Penrose*. Oxford University Press.

- Friedrich, H. 2002. Conformal Einstein evolution. Page 1 of: Frauendiener, J., and Friedrich, H. (eds), *The conformal structure of spacetime: geometry, analysis, numerics*. Lecture Notes in Physics. Springer.
- Friedrich, H. 2003a. Conformal geodesics on vacuum spacetimes. *Comm. Math. Phys.*, **235**, 513.
- Friedrich, H. 2003b. Spin-2 fields on Minkowski space near space-like and null infinity. *Class. Quantum Grav.*, **20**, 101.
- Friedrich, H. 2004. Smoothness at null infinity and the structure of initial data. In: Chruściel, P. T., and Friedrich, H. (eds), *50 years of the Cauchy problem in general relativity*. Birkhauser.
- Friedrich, H. 2005. On the non-linearity of the subsidiary systems. *Class. Quantum Grav.*, **22**, L77.
- Friedrich, H. 2007. Static vacuum solutions from convergent null data expansions at space-like infinity. *Ann. Henri Poincaré*, **8**, 817.
- Friedrich, H. 2008a. Conformal classes of asymptotically flat, static vacuum data. *Class. Quantum Grav.*, **25**, 065012.
- Friedrich, H. 2008b. One-parameter families of conformally related asymptotically flat, static vacuum data. *Class. Quantum Grav.*, **25**, 135012.
- Friedrich, H. 2009. Initial boundary value problems for Einstein's field equations and geometric uniqueness. *Gen. Rel. Grav.*, **41**, 1947.
- Friedrich, H. 2011. Yamabe numbers and the Brill-Cantor criterion. *Ann. Inst. H. Poincaré*, **12**, 1019.
- Friedrich, H. 2013. Conformal structure of static vacuum data. *Comm. Math. Phys.*, **321**, 419.
- Friedrich, H. 2014a. On the AdS stability problem. *Class. Quantum Grav.*, **31**, 105001.
- Friedrich, H. 2014b. The Taylor expansion at past time-like infinity. *Comm. Math. Phys.*, **324**, 263.
- Friedrich, H. 2015a. Geometric asymptotics and beyond. Page 37 of: Bieri, L., and Yau, S.-T. (eds), *One hundred years of general relativity*. Surveys in Differential Geometry, vol. 20. International Press.
- Friedrich, H. 2015b. Smooth non-zero rest-mass evolution across time-like infinity. *Ann. Henri Poincaré*, **16**, 2215.
- Friedrich, H., and Kánnár, J. 2000a. Bondi-type systems near space-like infinity and the calculation of the NP-constants. *J. Math. Phys.*, **41**, 2195.
- Friedrich, H., and Kánnár, J. 2000b. Calculating asymptotic quantities near space-like infinity and null infinity from Cauchy data. *Annalen Phys.*, **9**, 321.
- Friedrich, H., and Nagy, G. 1999. The initial boundary value problem for Einstein's vacuum field equation. *Comm. Math. Phys.*, **201**, 619.
- Friedrich, H., and Rendall, A. D. 2000. The Cauchy problem for the Einstein equations. *Lect. Notes. Phys.*, **540**, 127.
- Friedrich, H., and Schmidt, B.G. 1987. Conformal geodesics in general relativity. *Proc. Roy. Soc. Lond. A*, **414**, 171.
- Friedrich, H., and Stewart, J. 1983. Characteristic initial data and wavefront singularities in general relativity. *Proc. Roy. Soc. Lond. A*, **385**, 345.
- Garabedian, P. R. 1986. *Partial differential equations*. AMS Chelsea Publishing.
- García, A. A., Hehl, F. W., Heinicke, C., and Macias, A. 2004. The Cotton tensor in Riemannian spacetimes. *Class. Quantum Grav.*, **21**, 1099.
- García-Parrado, A., Gasperín, E., and Valiente Kroon, J.A. 2014. Conformal geodesics in the Schwarzschild-de Sitter and Schwarzschild anti-de Sitter spacetimes. In preparation.

- Gasperín, E., and Valiente Kroon, J. A. 2015. Spinorial wave equations and the stability of the Milne universe. *Class. Quantum Grav.*, **32**, 185021.
- Geroch, R. 1968. Spinor structure of spacetimes in general relativity I. *J. Math. Phys.*, **9**, 1739.
- Geroch, R. 1970a. Multipole moments. I. Flat space. *J. Math. Phys.*, **11**, 1955.
- Geroch, R. 1970b. Multipole moments. II. Curved space. *J. Math. Phys.*, **11**, 2580.
- Geroch, R. 1970c. Spinor structure of spacetimes in general relativity II. *J. Math. Phys.*, **11**, 343.
- Geroch, R. 1971a. A method for generating new solutions of Einstein's equations. *J. Math. Phys.*, **12**, 918.
- Geroch, R. 1971b. Space-time structure from a global view point. Page 71 of: Sachs, R. K. (ed), *General relativity and cosmology. Proceedings of the International School in Physics "Enrico Fermi", Course 48*. Academic Press.
- Geroch, R. 1972a. A method for generating new solutions of Einstein's equations. II. *J. Math. Phys.*, **13**, 394.
- Geroch, R. 1972b. Structure of the gravitational field at spatial infinity. *J. Math. Phys.*, **13**, 956.
- Geroch, R. 1976. Asymptotic structure of space-time. In: Esposito, E. P., and Witten, L. (eds), *Asymptotic structure of spacetime*. Plenum Press.
- Geroch, R., Held, A., and Penrose, R. 1973. A space-time calculus based on pairs of null directions. *J. Math. Phys.*, **14**, 874.
- Gourgoulhon, E. 2012. *3 + 1 Formalism in general relativity: bases of numerical relativity*. Lect. Notes. Phys. **846**. Springer Verlag.
- Gowers, T. (ed). 2008. *The Princeton companion to mathematics*. Princeton University Press.
- Graham, C. R., and Hirachi, K. 2005. The ambient obstruction tensor and Q-curvature. Page 59 of: *AdS/CFT correspondence: Einstein metrics and their conformal boundaries*. IRMA Lect. Math. Theor. Phys., vol. 8. Eur. Math. Soc. Zürich.
- Griffiths, J. B., and Podolský, J. 2009. *Exact space-times in Einstein's general relativity*. Cambridge University Press.
- Guès, O. 1990. Problème mixte hyperbolique quasi-linéaire caractéristique. *Comm. Part. Diff. Eqns.*, **15**, 595.
- Gundlach, C., and Martín-García, J. M. 2007. Critical phenomena in gravitational collapse. *Living Rev. Relativity*, **10**, 5. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2007-5.
- Günther, P. 1975. Spinorkalkül und Normalkoordinaten. *Z. Angew. Math. Mech.*, **55**, 205.
- Guven, J., and O'Murchadha, N. 1995. Constraints in spherically symmetric classical general relativity. I. Optical scalars, foliations, bounds on the configuration space variables, and the positivity of the quasilocal mass. *Phys. Rev. D*, **52**, 758.
- Hamilton, R. 1982. The inverse function theorem of Nash and Moser. *Bull. Am. Math. Soc.*, **7**, 65.
- Hansen, R. O. 1974. Multipole moments of stationary spacetimes. *J. Math. Phys.*, **15**, 46.
- Hartman, P. 1987. *Ordinary differential equations*. SIAM.
- Hawking, S. W., and Ellis, G. F. R. 1973. *The large scale structure of space-time*. Cambridge University Press.
- Henneaux, M., and Teitelboim, C. 1985. Asymptotically anti-de Sitter spaces. *Comm. Math. Phys.*, **98**, 391.
- Hennig, J., and Ansorg, M. 2009. A fully pseudospectral scheme for solving singular hyperbolic equations. *J. Hyp. Diff. Eqns.*, **6**, 161.

- Herberthson, H. 2009. Static spacetimes with prescribed multipole moments: a proof of a conjecture by Geroch. *Class. Quantum Grav.*, **26**, 215009.
- Herberthson, M., and Ludwig, G. 1994. Time-like infinity and direction-dependent metrics. *Class. Quantum Grav.*, **11**, 187.
- Holst, M., Nagy, G., and Tsogtgerel, G. 2008a. Far-from-constant mean curvature solutions of Einstein's constraint equations with positive Yamabe metrics. *Phys. Rev. Lett.*, **100**, 161101.
- Holst, M., Nagy, G., and Tsogtgerel, G. 2008b. Rough solutions of the Einstein constraints on closed manifolds without near-CMC conditions. *Comm. Math. Phys.*, **288**, 547.
- Hübner, P. 1995. General relativistic scalar-field models and asymptotic flatness. *Class. Quantum Grav.*, **12**, 791.
- Hübner, P. 1999a. How to avoid artificial boundaries in the numerical calculation of black hole spacetimes. *Class. Quantum Grav.*, **16**, 2145.
- Hübner, P. 1999b. A scheme to numerically evolve data for the conformal Einstein equation. *Class. Quantum Grav.*, **16**, 2823.
- Hübner, P. 2001a. From now to timelike infinity on a finite grid. *Class. Quantum Grav.*, **18**, 1871.
- Hübner, P. 2001b. Numerical calculation of conformally smooth hyperboloidal data. *Class. Quantum Grav.*, **18**, 1421.
- Hughes, T. J. R., Kato, T., and Marsden, J. E. 1977. Well-posed quasi-linear second-order hyperbolic systems with applications to nonlinear elastodynamics and general relativity. *Arch. Ration. Mech. Anal.*, **63**, 273.
- Husa, S. 2002. Problems and successes in the numerical approach to the conformal field equations. Page 239 of: Frauendiener, J., and Friedrich, H. (eds), *The conformal structure of space-time: geometry, analysis, numerics*. Springer.
- Ionescu, A. D., and Klainerman, S. 2009a. On the uniqueness of smooth, stationary black holes in vacuum. *Inventiones mathematicae*, **175**, 35.
- Ionescu, A. D., and Klainerman, S. 2009b. Uniqueness results for ill-posed characteristic problems in curved spacetimes. *Comm. Math. Phys.*, **285**, 873.
- Isenberg, J. 1995. Constant mean curvature solutions of the Einstein constraint equations on closed manifolds. *Class. Quantum Grav.*, **12**, 2249.
- Isenberg, J. 2013. Initial value problem in general relativity. In: Ashtekar, A., and Petkov, V. (eds), *The Springer handbook of spacetime*. Springer Verlag.
- Ishibashi, A., and Wald, R. M. 2004. Dynamics in non-globally-hyperbolic spacetimes III: anti de Sitter spacetime. *Class. Quantum Grav.*, **21**, 2981.
- Jaramillo, J. L., Valiente Kroon, J.A., and Gourgoulhon, E. 2008. From geometry to numerics: interdisciplinary aspects in mathematical and numerical relativity. *Class. Quantum Grav.*, **25**, 093001.
- Kánnár, J. 1996a. Hyperboloidal initial data for the vacuum field equations with cosmological constant. *Class. Quantum Grav.*, **13**, 3075.
- Kánnár, J. 1996b. On the existence of C^∞ solutions to the asymptotic characteristic initial value problem in general relativity. *Proc. Roy. Soc. Lond. A*, **452**, 945.
- Kato, T. 1975a. The Cauchy problem for quasi-linear symmetric hyperbolic systems. *Arch. Ration. Mech. Anal.*, **58**, 181.
- Kato, T. 1975b. Quasi-linear equations of evolution, with applications to partial differential equations. *Lect. Notes Math.*, **448**, 25.
- Kennefick, D. 2007. *Traveling at the speed of thought: Einstein and the quest for gravitational waves*. Princeton University Press.
- Kennefick, D., and O'Murchadha, N. 1995. Weakly decaying asymptotically flat static and stationary solutions to the Einstein equations. *Class. Quantum Grav.*, **12**, 149.

- Klainerman, S. 1984. The null condition and global existence to nonlinear wave equations. *Lect. Appl. Math.* **23**, 293.
- Klainerman, S. 2008. Partial differential equations. Page 455 of: Gowers, T., Barrow-Green, J., and Leader, I. (eds), *The Princeton companion to mathematics*. Princeton University Press.
- Kobayashi, S. 1995. *Transformation groups in differential geometry*. Springer Verlag.
- Kobayashi, S., and Nomizu, K. 2009. *Foundations of differential geometry*. Vol. 1. Wiley.
- Kodaira, K. 1986. *Complex manifolds and deformation of complex structures*. Springer Verlag.
- Kozameh, C., Newman, E. T., and Tod, K. P. 1985. Conformal Einstein spaces. *Gen. Rel. Grav.*, **17**, 343.
- Krantz, S. G. 2006. *Geometric function theory*. Birkhäuser.
- Kreiss, H.-O., and Lorenz, J. 1998. Stability for time-dependent differential equations. *Acta Numerica*, **7**(203).
- Kreiss, H.-O., Reula, O., Sarbach, O., and Winicour, J. 2009. Boundary conditions for coupled quasilinear wave equations with applications to isolated systems. *Comm. Math. Phys.*, **289**, 1099.
- Kulkarni, R. S., and Pinkall, U. (eds). 1988. *Conformal geometry*. Aspects of Mathematics. Friedrich Vieweg & Sohn.
- Kundu, P. 1981. On the analyticity of stationary gravitational fields at spacial infinity. *J. Math. Phys.*, **22**, 2006.
- Künzle, H. P. 1967. Construction of singularity free spherically symmetric spacetime manifolds. *Proc. Roy. Soc. Lond. A*, **297**, 244.
- Lee, J. M. 1997. *Riemannian manifolds: an introduction to curvature*. Springer Verlag.
- Lee, J. M. 2000. *Introduction to topological manifolds*. Springer Verlag.
- Lee, J. M. 2002. *Introduction to smooth manifolds*. Springer Verlag.
- Lee, J. M., and Parker, T. H. 1987. The Yamabe problem. *Bull. Am. Math. Soc.*, **17**, 37.
- Lehner, L., and Pretorius, F. 2014. Numerical relativity and astrophysics. *Ann. Rev. Astron. Astrophys.*, **52**, 661.
- Lübbe, C. 2014. *Conformal scalar fields, isotropic singularities and conformal cyclic cosmologies*. In [arXiv:1312.2059](https://arxiv.org/abs/1312.2059).
- Lübbe, C., and Valiente Kroon, J. A. 2009. On de Sitter-like and Minkowski-like spacetimes. *Class. Quantum Grav.*, **26**, 145012.
- Lübbe, C., and Valiente Kroon, J. A. 2010. A stability result for purely radiative spacetimes. *J. Hyp. Diff. Eqns.*, **7**, 545.
- Lübbe, C., and Valiente Kroon, J. A. 2012. The extended conformal Einstein field equations with matter: the Einstein-Maxwell system. *J. Geom. Phys.*, **62**, 1548.
- Lübbe, C., and Valiente Kroon, J. A. 2013a. A class of conformal curves in the Reissner-Nordström spacetime. *Ann. Henri Poincaré*, **15**, 1327.
- Lübbe, C., and Valiente Kroon, J. A. 2013b. A conformal approach for the analysis of the non-linear stability of pure radiation cosmologies. *Ann. Phys.*, **328**, 1.
- Lübbe, C., and Valiente Kroon, J. A. 2014. On the conformal structure of the extremal Reissner-Nordström spacetime. *Class. Quantum Grav.*, **31**, 175015.
- Ludvigsen, M., and Vickers, J. A. G. 1981. The positivity of the Bondi mass. *J. Phys. A*, **14**, L389.
- Ludvigsen, M., and Vickers, J. A. G. 1982. A simple proof of the positivity of the Bondi mass. *J. Phys. A*, **15**, L67.
- Macedo, R. P., and Ansorg, M. 2014. Axisymmetric fully spectral code for hyperbolic equations. In [arXiv:1402.7343](https://arxiv.org/abs/1402.7343).
- Machado, M. P., and Vickers, J. A. G. 1995. A space-time calculus invariant under null rotations. *Proc. Roy. Soc. Lond. A*, **450**, 1.

- Machado, M. P., and Vickers, J. A. G. 1996. Invariant differential operators and the Karlhede classification of type N vacuum solutions. *Class. Quantum Grav.*, **13**, 1589.
- Maldacena, J. 1998. The large N limit of superconformal field theories and supergravity. *Adv. Theor. Math. Phys.*, **2**, 231.
- Maliborski, M., and Rostworowski, A. 2013. Lecture notes on turbulent instability of anti-de Sitter spacetime. *J. Mod. Phys. A*, **28**, 1340020.
- Martín-García, J. M. 2014. www.xact.es.
- Mason, L. J. 1986. The conformal Einstein equations. *Twistor Newsletter*, **22**, 41.
- Mason, L. J. 1995. The vacuum and Bach equations in terms of light cone cuts. *J. Math. Phys.*, **36**, 3704.
- Miao, P. 2003. On the existence of static metric extensions in general relativity. *Comm. Math. Phys.*, **241**, 27.
- Misner, C. W., Thorne, K. S., and Wheeler, J. A. 1973. *Gravitation*. W. H. Freeman.
- Morrey, C. B. 1958. On the analyticity of the solutions of analytic non-linear elliptic systems of partial differential equations. *Am. J. Math.*, **80**, 198.
- Morris, M. S., and Thorne, K. S. 1988. Wormholes in spacetime and their use for interstellar travel: a tool for teaching general relativity. *Am. J. Phys.*, **56**, 395.
- Müller zu Hagen, H. 1970. On the analyticity of stationary vacuum solutions of Einstein's equation. *Proc. Camb. Phil. Soc.*, **68**, 199.
- Müller zu Hagen, H., and Seifert, H.-J. 1977. On characteristic initial-value and mixed problems. *Gen. Rel. Grav.*, **8**, 259.
- Newman, E. T., and Penrose, R. 1962. An approach to gravitational radiation by a method of spin coefficients. *J. Math. Phys.*, **3**, 566.
- Newman, E. T., and Penrose, R. 1963. Errata: an approach to gravitational radiation by a method of spin coefficients. *J. Math. Phys.*, **4**, 998.
- Newman, E. T., and Penrose, R. 1965. 10 exact gravitationally-conserved quantities. *Phys. Rev. Lett.*, **15**, 231.
- Newman, E. T., and Penrose, R. 1966. Note on the Bondi-Metzner-Sachs group. *J. Math. Phys.*, **7**, 863.
- Newman, E. T., and Penrose, R. 1968. New conservation laws for zero rest-mass fields in asymptotically flat space-time. *Proc. Roy. Soc. Lond. A*, **305**, 175.
- Newman, E. T., and Tod, K. P. 1980. Asymptotically flat space-times. In: Held, A. (ed), *General relativity and gravitation: one hundred years after the birth of Albert Einstein*. Plenum.
- Newman, R. P. A. C. 1989. The global structure of simple space-times. *Comm. Math. Phys.*, **123**, 17.
- Nicolas, J.-P. 2015. The conformal approach to asymptotic analysis. In [arXiv:1508.02592](https://arxiv.org/abs/1508.02592).
- O'Donnell, P. 2003. *Introduction to 2-spinors in general relativity*. World Scientific.
- Ogiue, K. 1967. Theory of conformal connections. *Kodai Math. Sem. Rep.*, **19**, 193.
- O'Murchadha, N. 1988. The Yamabe problem and general relativity. *Proc. Centre Math. Anal. (A.N.U.)*, **19**(137).
- O'Neill, B. 1983. *Semi-Riemannian geometry with applications to relativity*. Academic Press.
- O'Neill, B. 1995. *The geometry of Kerr black holes*. A. K. Peters.
- Paetz, T.-T. 2015. Conformally covariant systems of wave equations and their equivalence to Einstein's field equations. *Ann. Henri Poincaré*, **16**, 2059.
- Penrose, R. 1960. A spinor approach to general relativity. *Ann. Phys. (New York)*, **10**, 171.

- Penrose, R. 1963. Asymptotic properties of fields and space-times. *Phys. Rev. Lett.*, **10**, 66.
- Penrose, R. 1964. Conformal approach to infinity. In: DeWitt, B. S., and DeWitt, C. M. (eds), *Relativity, groups and topology: the 1963 Les Houches lectures*. Gordon and Breach.
- Penrose, R. 1965. Zero rest-mass fields including gravitation: asymptotic behaviour. *Proc. Roy. Soc. Lond. A*, **284**, 159.
- Penrose, R. 1967. Structure of space-time. Page 121 of: DeWitt, C. M., and Wheeler, J. A. (eds), *Battelle rencontres: 1967 lectures in mathematics and physics*. W. A. Benjamin.
- Penrose, R. 1969. Gravitational collapse: the role of general relativity. *Rev. Nuovo Cimento*, **I**, 257.
- Penrose, R. 1979. Singularities and time asymmetry. Page 581 of: Hawking, S. W., and Israel, W. (eds), *General relativity: an Einstein centenary survey*. Cambridge University Press.
- Penrose, R. 1980. Null hypersurface initial data for classical fields of arbitrary spin and for general relativity. *Gen. Rel. Grav.*, **12**, 225.
- Penrose, R. 1983. Spinors and torsion in general relativity. *Found. Phys.*, **13**, 325.
- Penrose, R. 2002. Gravitational collapse: the role of general relativity. *Gen. Rel. Grav.*, **34**, 1141.
- Penrose, R. 2011. Reprint of: Conformal treatment of infinity. *Gen. Rel. Grav.*, **43**, 901.
- Penrose, R., and Rindler, W. 1984. *Spinors and space-time*. Vol. 1: *Two-spinor calculus and relativistic fields*. Cambridge University Press.
- Penrose, R., and Rindler, W. 1986. *Spinors and space-time*. Vol. 2: *Spinor and twistor methods in space-time geometry*. Cambridge University Press.
- Persides, S. 1979. A definition of asymptotically Minkowskian space-times. *J. Math. Phys.*, **20**, 1731.
- Persides, S. 1980. Structure of the gravitational field at spatial infinity. II. Asymptotically Minkowski spaces. *J. Math. Phys.*, **21**, 142.
- Persides, S. 1982a. Timelike infinity. *J. Math. Phys.*, **23**, 283.
- Persides, S. 1982b. A unified formulation of timelike, null and spatial infinity. *J. Math. Phys.*, **23**, 289.
- Petersen, P. 1991. *Riemannian geometry*. Graduate Texts in Mathematics, vol. 171. Springer.
- Poisson, E., and Will, C. M. 2015. *Gravity: Newtonian, post-Newtonian, relativistic*. Cambridge University Press.
- Porrill, J. 1982. The structure of timelike infinity for isolated systems. *Proc. Roy. Soc. Lond. A*, **381**, 323.
- Pretorius, F. 2009. Binary black hole coalescence. Page 305 of: Colpi, M., Casella, P., Gorini, V., Moschella, U., and Possenti, A. (eds), *Physics of relativistic objects in compact binaries: from birth to coalescence*. Springer.
- Pugliese, D., and Valiente Kroon, J. A. 2012. On the evolution equations for ideal magnetohydrodynamics in curved spacetime. *Gen. Rel. Grav.*, **44**, 2785.
- Pugliese, D., and Valiente Kroon, J. A. 2013. On the evolution equations for a self-gravitating charged scalar field. *Gen. Rel. Grav.*, **45**, 1247.
- Quevedo, H. 1990. Multipole moments in general relativity: static and stationary vacuum solutions. *Fortsch. der Physik*, **38**, 733.
- Reinhart, B. L. 1973. Maximal foliations of extended Schwarzschild space. *J. Math. Phys.*, **14**, 719.
- Reiris, M. 2014a. Stationary solutions and asymptotic flatness I. *Class. Quantum Grav.*, **31**, 155012.

- Reiris, M. 2014b. Stationary solutions and asymptotic flatness II. *Class. Quantum Grav.*, **31**, 155013.
- Rendall, A. D. 1990. Reduction of the characteristic initial value problem to the Cauchy problem and its application to the Einstein equations. *Proc. Roy. Soc. Lond. A*, **427**, 221.
- Rendall, A. D. 2005. Theorems on existence and global dynamics for the Einstein equations. *Living Rev. Relativity*, **8**, 6. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2005-6.
- Rendall, A. D. 2008. *Partial differential equations in general relativity*. Oxford University Press.
- Reula, O. 1989. On existence and behaviour of asymptotically flat solutions to the stationary Einstein equations. *Comm. Math. Phys.*, **122**, 615.
- Reula, O. 1998. Hyperbolic methods for Einstein's equations. *Living Rev. Rel.*, **3**, 1.
- Ringström, H. 2009. *The Cauchy problem in general relativity*. Eur. Math. Soc. Zürich.
- Rinne, O. 2010. An axisymmetric evolution code for the Einstein equations on hyperboloidal slices. *Class. Quantum Grav.*, **27**, 035014.
- Rinne, O. 2014. Formation and decay of Einstein-Yang-Mills black holes. *Phys. Rev. D*, **90**, 124084.
- Rinne, O., and Moncrief, V. 2013. Hyperboloidal Einstein-matter evolution and tails for scalar and Yang–Mills fields. *Class. Quantum Grav.*, **30**, 095009.
- Rodnianski, I., and Speck, J. 2013. The nonlinear future-stability of the FLRW family of solutions to the Euler-Einstein system with a positive cosmological constant. *J. Eur. Math. Soc.*, **15**, 2369.
- Sachs, R. K. 1962a. Asymptotic symmetries in gravitational theory. *Phys. Rev.*, **128**, 2851.
- Sachs, R. K. 1962b. Gravitational waves in general relativity VIII. Waves in asymptotically flat space-time. *Proc. Roy. Soc. Lond. A*, **270**, 103.
- Sachs, R. K. 1962c. On the characteristic initial value problem in gravitational theory. *J. Math. Phys.*, **3**, 908.
- Sbierski, J. 2013. On the existence of a maximal Cauchy development for the Einstein equations: a dezornification. *Ann. Henri Poincaré: Online First*.
- Schmidt, B., Walker, M., and Sommers, P. 1975. A characterization of the Bondi-Metzner-Sachs group. *Gen. Rel. Grav.*, **5**, 489.
- Schmidt, B. G. 1978. Asymptotic structure of isolated systems. Page 11 of: Ehlers, J. (ed), *Isolated systems in general relativity, Proceedings of the International School of Physics "Enrico Fermi", Course 67*. North Holland Publishing Company.
- Schmidt, B. G. 1981. The decay of the gravitational field. *Comm. Math. Phys.*, **78**, 447.
- Schmidt, B. G. 1986. Conformal geodesics. *Lect. Notes. Phys.*, **261**, 135.
- Schmidt, B. G. 1987. Gravitational radiation near spatial and null infinity. *Proc. Roy. Soc. Lond. A*, **410**, 201.
- Schmidt, B. G. 1996. Vacuum space-times with toroidal null infinities. *Class. Quantum Grav.*, **13**, 2811.
- Schmidt, B. G., and Walker, M. 1983. Analytic conformal extensions of asymptotically flat spacetimes. *J. Phys. A: Math. Gen.*, **16**, 2187.
- Schoen, R. 1984. Conformal deformation of a Riemannian metric to constant scalar curvature. *J. Diff. Geom.*, **20**, 479.
- Schoen, R., and Yau, S. T. 1979. On the proof of the positive mass conjecture in general relativity. *Comm. Math. Phys.*, **65**, 45.
- Schouten, J. A. 1921. Über die konforme Abbildung n -dimensionaler Mannigfaltigkeiten mit quadratischer Massbestimmung auf eine Mannigfaltigkeit mit euklidischer Massbestimmung. *Math. Zeitschrift*, **11**, 58.

- Schwarzschild, K. 1916. Über das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie. *Sitz. Preuss. Akad. Wiss. Berlin*, **7**, 189–196.
- Schwarzschild, K. 2003. “Golden oldie”: on the gravitational field of a mass point according to Einstein’s theory. *Gen. Rel. Grav.*, **35**, 951.
- Sen, A. 1981. On the existence of neutrino “zero-modes” in vacuum spacetimes. *J. Math. Phys.*, **22**, 1781.
- Sexl, R. U., and Urbantke, H. K. 2000. *Relativity, groups, particles: special relativity and relativistic symmetry in field and particle physics*. Springer.
- Shapiro, I. 1999. A century of relativity. *Rev. Mod. Phys.*, **71**, S41.
- Shinbrot, M., and Welland, R. R. 1976. The Cauchy-Kowaleskaya. *J. Math. An. App.*, **55**, 757.
- Simon, W. 1992. Radiative Einstein-Maxwell spacetimes and “no-hair” theorems. *Class. Quantum Grav.*, **9**, 241.
- Sommers, P. 1980. Space spinors. *J. Math. Phys.*, **21**, 2567.
- Speck, J. 2012. The nonlinear future-stability of the FLRW family of solutions to the Euler-Einstein system with a positive cosmological constant. *Selecta Mathematica*, **18**, 633.
- Spivak, M. 1970. *A comprehensive introduction to differential geometry*. Vol. I. Publish or Perish.
- Stephani, H., Kramer, D., MacCallum, M. A. H., Hoenselaers, C., and Herlt, E. 2003. *Exact solutions of Einstein’s field equations*, 2nd edition. Cambridge University Press.
- Stewart, J. 1991. *Advanced general relativity*. Cambridge University Press.
- Synge, J. L. 1960. *Relativity: the general theory*. North Holland Publishing Company.
- Szabados, L. B. 1994. Two-dimensional Sen connections in general relativity. *Class. Quantum Grav.*, **11**, 1833.
- Szabados, L. B. 2009. Quasi-local energy-momentum and angular momentum in General Relativity. *Living Rev. Relativity*, **12**, 4. URL (cited on 24 May 2016): www.livingreviews.org/lrr-2009-4.
- Szegő, G. 1978. *Orthogonal polynomials*. AMS Colloq. Pub., vol. 23. AMS.
- Szekeres, P. 1965. The gravitational compass. *J. Math. Phys.*, **6**, 1387.
- Tataru, D. 2004. The wave maps equation. *Bull. Am. Math. Soc.*, **41**, 185.
- Taubes, C. H. 2011. *Differential geometry*. Oxford University Press.
- Taylor, M. E. 1996a. *Partial differential equations I: basic theory*. Springer Verlag.
- Taylor, M. E. 1996b. *Partial differential equations II: qualitative studies of linear equations*. Springer Verlag.
- Taylor, M. E. 1996c. *Partial differential equations III: nonlinear equations*. Springer Verlag.
- Tod, K. P. 1984. Three-surface twistors and conformal embedding. *Gen. Rel. Grav.*, **16**, 435.
- Tod, K. P. 2002. Isotropic cosmological singularities. Page 123 of: Frauendiener, J., and Friedrich, H. (eds), *The conformal structure of space-time: geometry, analysis, numerics*. Lect. Notes. Phys. **604** Springer.
- Tod, K. P. 2003. Isotropic cosmological singularities: other matter models. *Class. Quantum Grav.*, **20**, 251.
- Tod, K. P. 2012. Some examples of the behaviour of conformal geodesics. *J. Geom. Phys.*, **62**, 1778.
- Torres del Castillo, G. F. 2003. *3-D spinors, spin-weighted functions and their applications*. Birkhäuser.
- Trautman, A. 1958. Radiation and boundary conditions in the theory of gravitation. *Bull. Academ. Pol. Sciences: Series des Sciences Math. Astron. Phys.*, **6**, 407.

- Trudinger, N. 1968. Remarks concerning the conformal deformation of Riemannian structures on compact manifolds. *Ann. Sc. Norm. Sup. Pisa*, **22**, 265.
- Valiente Kroon, J. A. 1998. Conserved quantities for polyhomogeneous spacetimes. *Class. Quantum Grav.*, **15**, 2479.
- Valiente Kroon, J. A. 1999a. A comment on the outgoing radiation condition and the peeling theorem. *Gen. Rel. Grav.*, **31**, 1219.
- Valiente Kroon, J. A. 1999b. Logarithmic Newman-Penrose constants for arbitrary polyhomogeneous spacetimes. *Class. Quantum Grav.*, **16**, 1653.
- Valiente Kroon, J. A. 2002. Polyhomogeneous expansions close to null and spatial infinity. Page 135 of: Frauendiner, J., and Friedrich, H. (eds), *The conformal structure of spacetimes: geometry, numerics, analysis*. Lecture Notes in Physics. Springer.
- Valiente Kroon, J. A. 2003. Early radiative properties of the developments of time symmetric conformally flat initial data. *Class. Quantum Grav.*, **20**, L53.
- Valiente Kroon, J. A. 2004a. Does asymptotic simplicity allow for radiation near spatial infinity? *Comm. Math. Phys.*, **251**, 211.
- Valiente Kroon, J. A. 2004b. A new class of obstructions to the smoothness of null infinity. *Comm. Math. Phys.*, **244**, 133.
- Valiente Kroon, J. A. 2004c. Time asymmetric spacetimes near null and spatial infinity. I. Expansions of developments of conformally flat data. *Class. Quantum Grav.*, **23**, 5457.
- Valiente Kroon, J. A. 2005. Time asymmetric spacetimes near null and spatial infinity. II. Expansions of developments of initial data sets with non-smooth conformal metrics. *Class. Quantum Grav.*, **22**, 1683.
- Valiente Kroon, J. A. 2007a. Asymptotic properties of the development of conformally flat data near spatial infinity. *Class. Quantum Grav.*, **24**, 3037.
- Valiente Kroon, J. A. 2007b. The Maxwell field on the Schwarzschild spacetime: behaviour near spatial infinity. *Proc. Roy. Soc. Lond. A*, **463**, 2609.
- Valiente Kroon, J. A. 2009. Estimates for the Maxwell field near the spatial and null infinity of the Schwarzschild spacetime. *J. Hyp. Diff. Eqns.*, **6**, 229.
- Valiente Kroon, J. A. 2010. A rigidity property of asymptotically simple spacetimes arising from conformally flat data. *Comm. Math. Phys.*, **298**, 673.
- Valiente Kroon, J. A. 2011. Asymptotic simplicity and static data. *Ann. Henri Poincaré*, **13**, 363.
- Valiente Kroon, J. A. 2012. *Global evaluations of static black hole spacetimes*. In preparation.
- Wald, R. M. 1983. Asymptotic behaviour of homogeneous cosmological models in the presence of a positive cosmological constant. *Phys. Rev. D*, **28**, 2118.
- Wald, R. M. 1984. *General relativity*. University of Chicago Press.
- Walker, M. 1970. Block diagrams and the extension of timelike two-surfaces. *J. Math. Phys.*, **11**, 2280.
- Weyl, H. 1918. Reine Infinitesimalgeometrie. *Math. Zeitschrift*, **2**, 404.
- Weyl, H. 1968. Zur Infinitesimal Geometrie: Einordnung der projektiven und der konformen Auffassung. Page 195 of: *Gesammelte Abhandlungen.*, vol. II. Springer Verlag.
- Will, C. M. 2014. The confrontation between general relativity and experiment. *Living. Rev. Relativity*, **17**.
- Willmore, T. J. 1993. *Riemannian geometry*. Oxford University Press.
- Winicour, J. 2012. Characteristic evolution and matching. *Living. Rev. Relativity*, **14**.
- Witten, E. 1998. Anti de Sitter space and holography. *Adv. Theor. Math. Phys.*, **2**, 253.

- Witten, E., and Yau, S.-T. 1999. Connectedness of the boundary in the AdS/CFT correspondence. *Adv. Theor. Math. Phys.*, 1635.
- Wong, W. W.-Y. 2013. A comment on the construction of the maximal globally hyperbolic Cauchy development. *J. Math. Phys.*, **54**, 113511.
- Yamabe, H. 1960. On a deformation of Riemannian structures on compact manifolds. *Osaka J. Mathematics*, **12**, 6126.
- York, J. W. Jr. 1971. Gravitational degrees of freedom and the initial-value problem. *Phys. Rev. Lett.*, **26**, 1656.
- York, J. W. Jr. 1972. Role of conformal three-geometry in the dynamics of gravitation. *Phys. Rev. Lett.*, **28**, 1082.
- York, J. W. Jr. 1973. Conformally covariant orthogonal decomposition of symmetric tensor on Riemannian manifolds and the initial value problem of general relativity. *J. Math. Phys.*, **14**, 456.
- Zenginoglu, A. 2006. A conformal approach to numerical calculations of asymptotically flat spacetimes. PhD thesis, Max-Planck Institute for Gravitational Physics (AEI) and University of Potsdam.
- Zenginoglu, A. 2007. Numerical calculations near spatial infinity. *J. Phys. Conf. Ser.*, **66**, 012027.
- Zenginoglu, A. 2008. A hyperboloidal study of tail decay rates for scalar and Yang-Mills fields. *Class. Quantum Grav.*, **25**, 195025.
- Zenginoglu, A. 2011a. A geometric framework for black hole perturbations. *Phys. Rev. D*, **83**, 127502.
- Zenginoglu, A. 2011b. Hyperboloidal layers for hyperbolic equations on unbounded domains. *J. Comput. Phys.*, **230**, 2286.
- Zenginoglu, A., and Kidder, L. E. 2010. Hyperboloidal evolution of test fields in three spatial dimensions. *Phys. Rev. D*, **81**, 124010.
- Zhiren, J. 1988. A counterexample to the Yamabe problem for complete non-compact manifolds. *Lect. Notes Math.*, **1306**, 93.