

Impressions of IAU-Symposium 200

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Ladies and gentlemen, dear friends:

Hans Zinnecker has asked me to express my impressions of this conference. My first impression here was this very modern lecture room. It contains no blackboard any more, and instead very modern tools for projecting slides and films. The room also has a supply of fresh air at EVERY seat of this room, so nobody has an excuse any more to fall asleep. When I heard the lectures on Monday, I had the feeling the whole universe was made out of binaries only. This impression reminds me of a story I have heard about Bohr and Pauli: Pauli visited Bohr at his summer cottage one day for a discussion on Quantum Theory. When Pauli approached the cottage, he saw a horse-shoe over the entrance door - a sign of good luck as you may know. Pauli, a very critical person, asked Bohr: "Do you believe in it, and that it will bring luck to you?" Bohr answered: "No, I don't believe in it. But I was told that it helps even if one does not believe in it." This story shows you the deeply positive way of how physicists think, and may therefore also encourage us to solve our problem.

When listening to the lectures of this conference, I noticed that Theoretical Astrophysics has improved very much in the last few years, especially through the use of fast computers which made possible the many calculations we saw. Instruments and observations have improved equally dramatically. The observational possibilities have now become immense. We can speak of a real breakthrough like in Quantum Theory in the 1920s.

Let me now say something concerning the title of this conference. The topic was binaries. This seemed to be a fairly limited subject, and I thought one would not be able to discuss such a limited subject the whole week long. But the result shows that it is very well possible. It is not only possible, but it is better to do so rather than just discussing it for two days. I enjoyed being in a community of scientists. The atmosphere was excellent. Thanks very much to Hans Zinnecker who had the idea and set the spirit for this meeting.

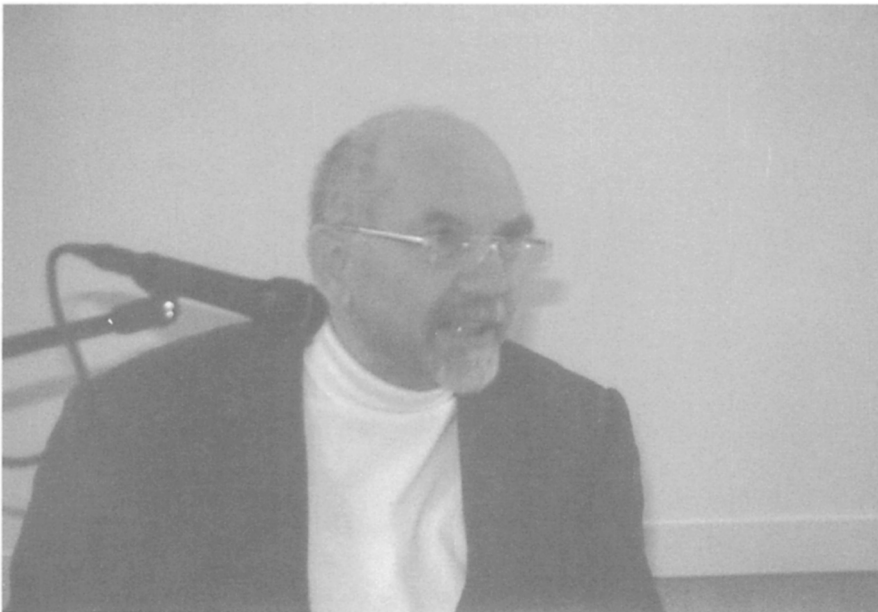
Concerning the formation of binaries and of single stars with a planetary system, I have the impression that there is a continuous transition: if the protobinary disk or the proto-stellar disk contains sufficient angular momentum - which may mostly be the case - then by fragmentation a binary system results, but if there is less than a certain limit, a single star with a planetary system is formed. Of course, we do not yet know the details.

Now I come to the future challenges of astronomers and astrophysicists. First of all, we should more often observe the turbulent velocities in binary disks, for in addition to gravitational angular momentum transfer by spiral den-

sity waves, there is a turbulent angular momentum transfer by the viscosity of the turbulence ITSELF and not only by shock waves which are produced by turbulence. Secondly, we should also measure in more detail the magnetic fields of binary disks. We have seen that angular momentum transfer out of the disk by magnetic field lines is possible, and that this influences the formation process. Finally, the theoreticians should develop a realistic theory of magneto-hydrodynamical turbulence to refine our understanding of the formation processes of binaries and single stars.

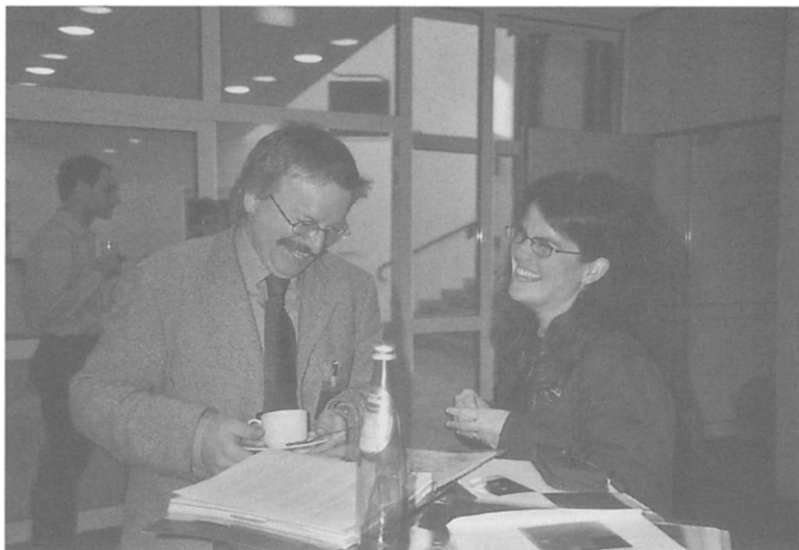
Let me now say a few words about the evening session on the extrasolar planetary systems. It is a great achievement to have observed several planetary systems, and I think that in ten years or so we will know which of the then known planetary systems contain water - the basis of life. When we know how planets are formed, we will know which star will have a planetary system like the solar one, and which planet will have similar conditions like the earth. Life will evolve on these planets and even human-like beings may arise. We are not alone in our universe, that's my conviction.

I am now coming to the end of my impressions: As we know from the discovery of Quantum-Mechanics the world is more mysterious than authors of science fiction could ever make up. Science will let us experience the unexpected much more profoundly than we can think of today. Thank you very much.



Rolf Ebert

More Impressions (Photos)



Günther Hasinger joking with Andrea Ghez (top)
Günther Hasinger serious with Reimar Lüst (bottom)



Balega, Hakobyan, Hambaryan at the Telegrafenberg site (top, from right)
Günther Hasinger and some distinguished participants before a guided tour to
the Einstein Turm (bottom)

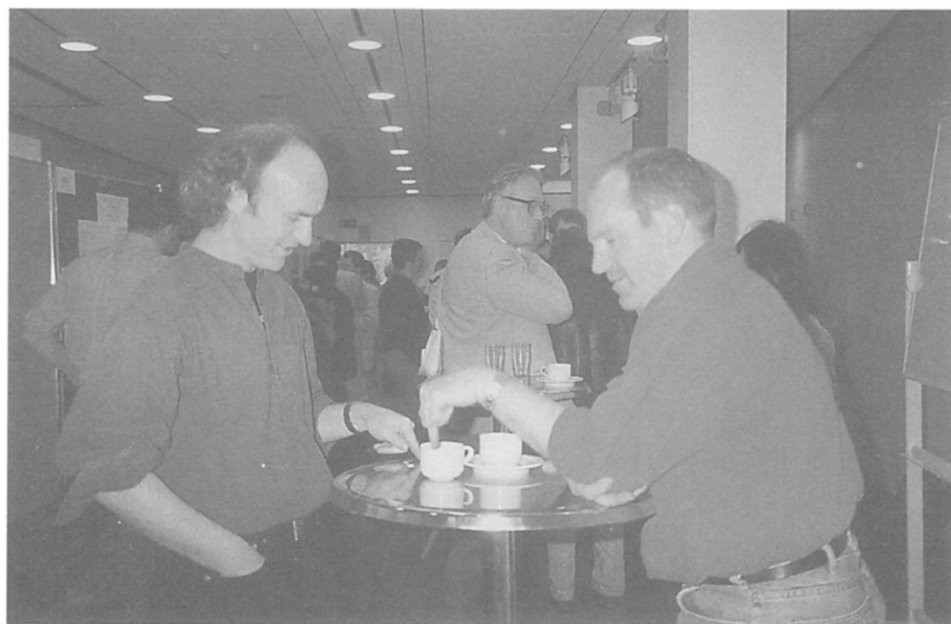
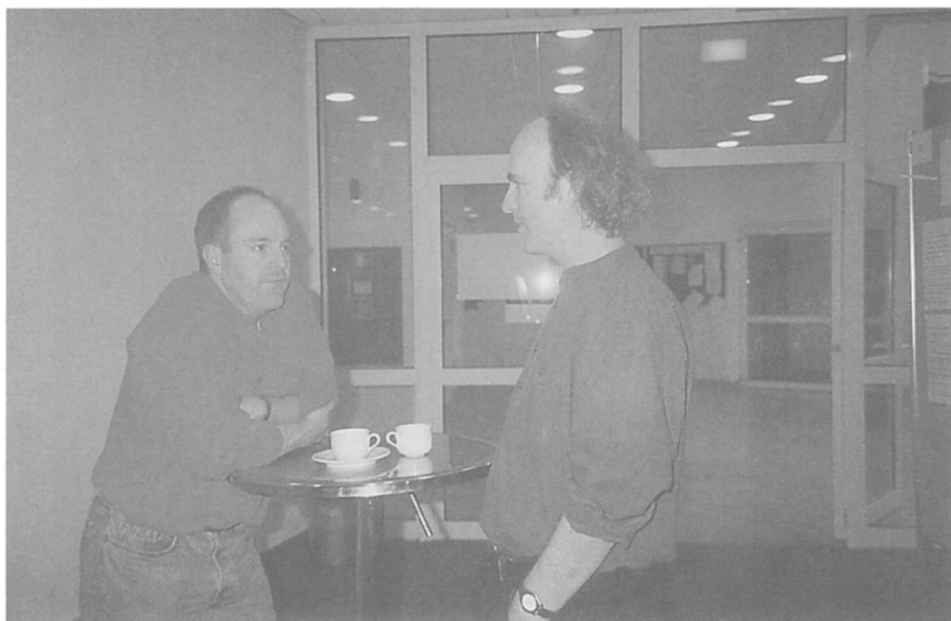


Some Telegrafenberg views

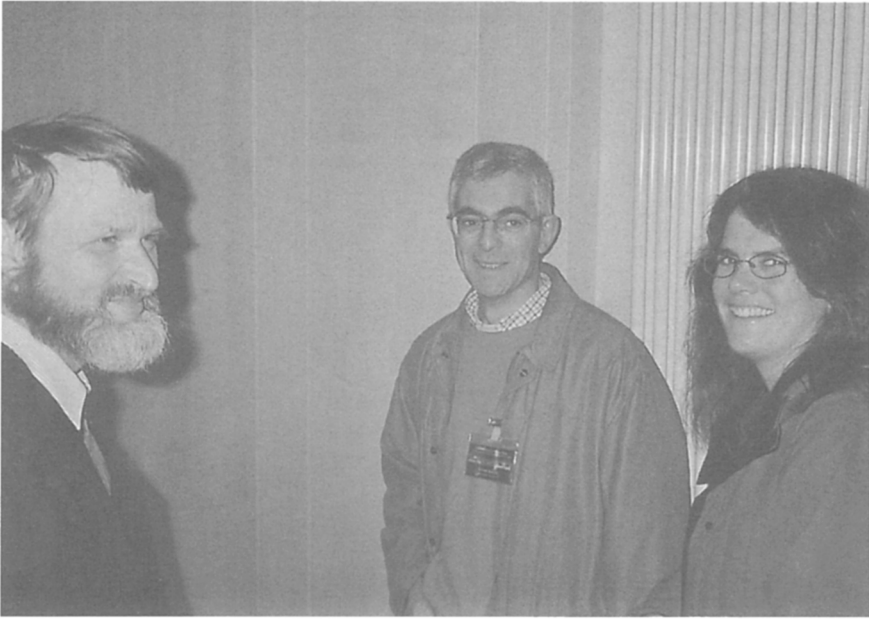
top: random pairing of cosmonauts (Yuri Gagarin and Sigmund Jähn)
bottom: random pairing of signposts (Vogelweg refers to H. C. Vogel)



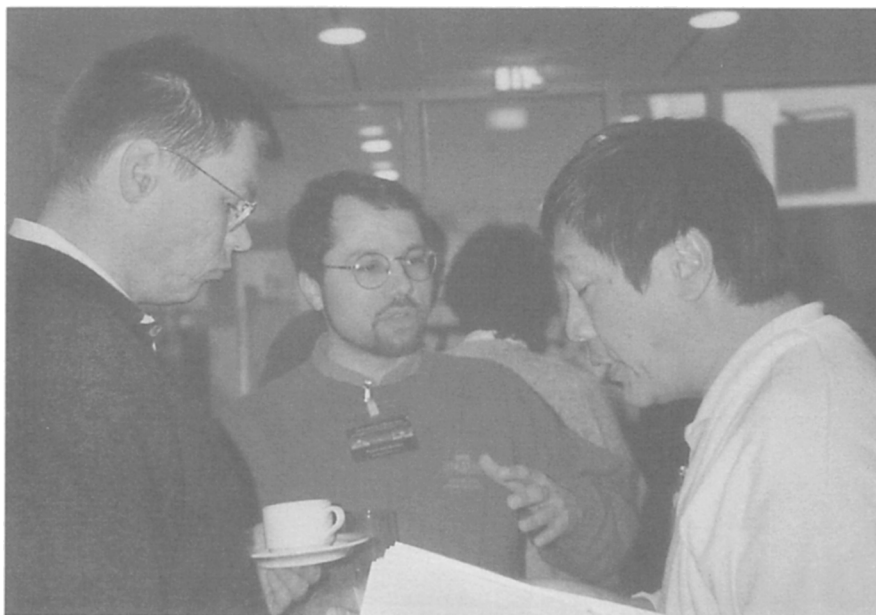
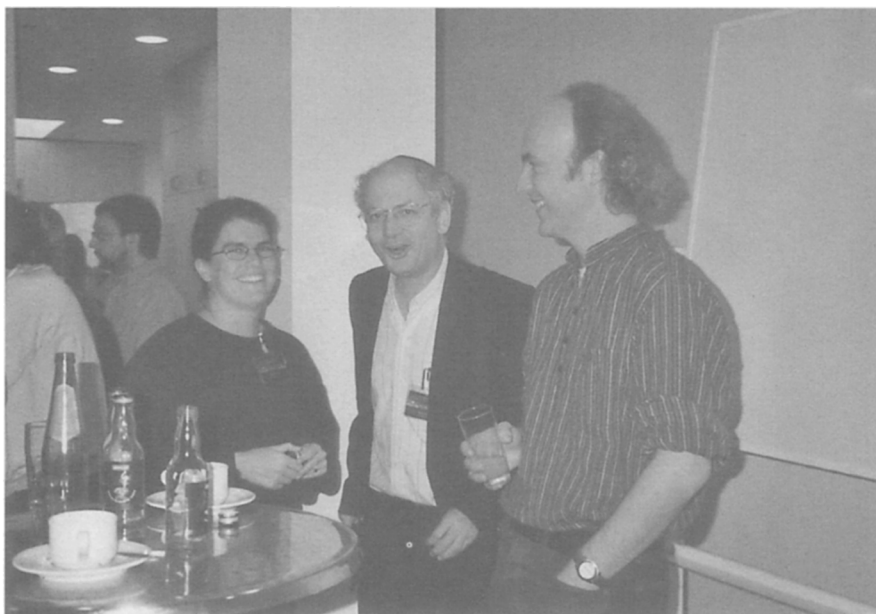
Palla and Wuchterl don't quite agree, but it does not show (top).
Palla and Plewa fully agree, and it shows ... (bottom).



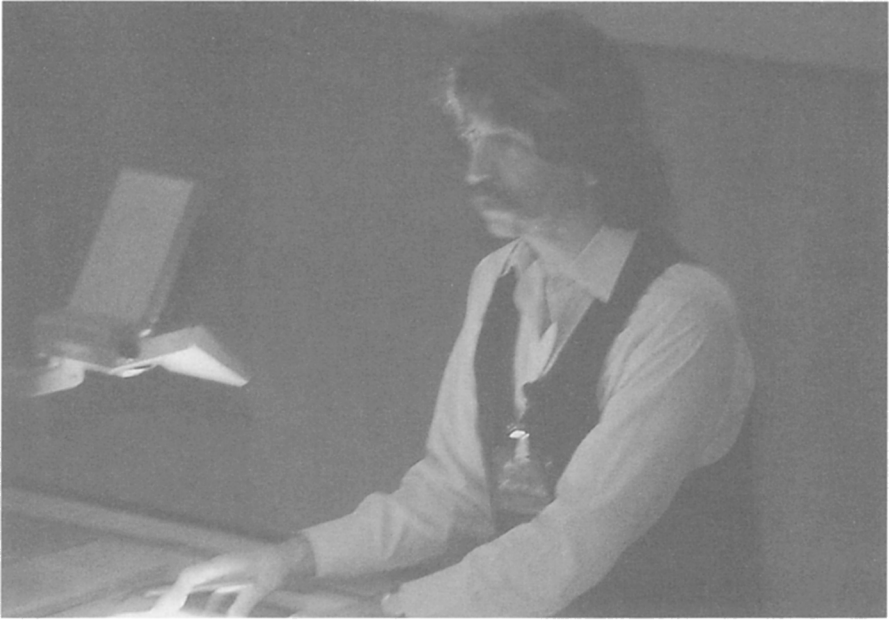
Viewed from left, viewed from right:
Mark McCaughrean and Ian Bonnell exchanging their views
during a coffee break



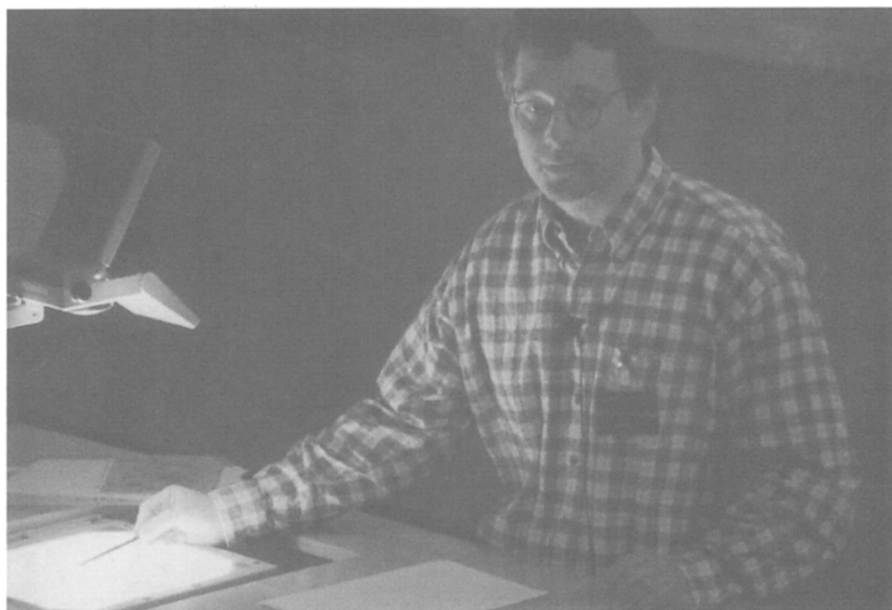
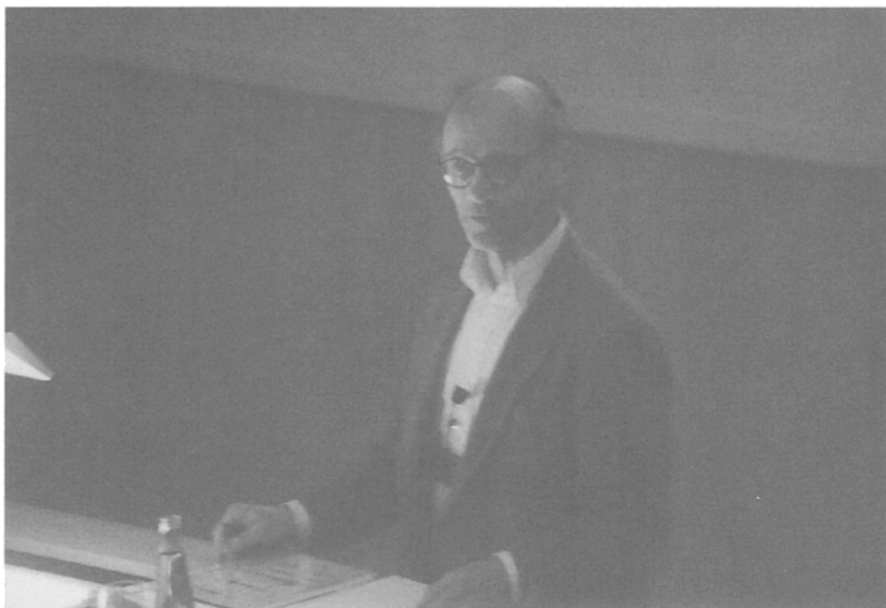
Two fine examples of hierarchical triple systems:
Ghez/Bouvier and Leinert (top, from right)
Dutrey/Guilloteau and Simon (bottom, from left)



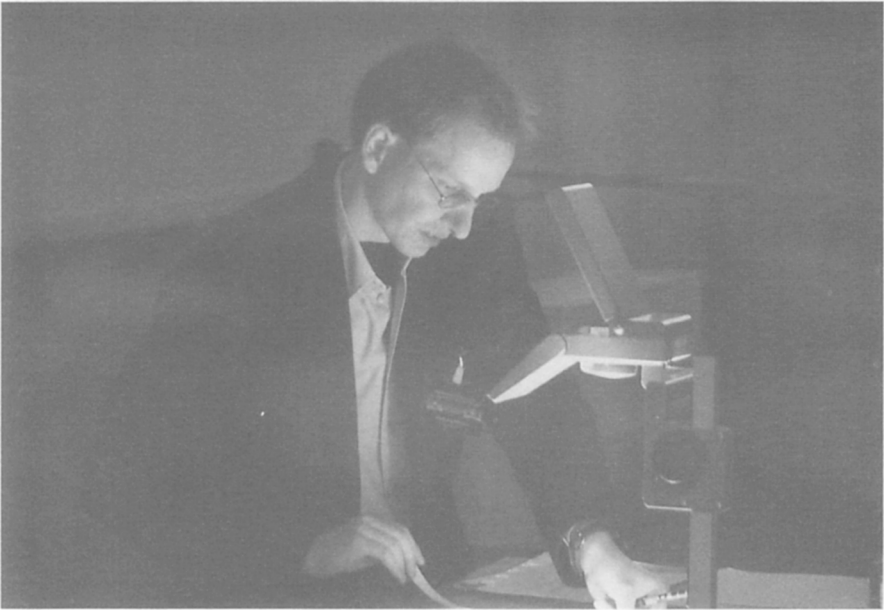
Another two examples of (probably unstable) triple systems:
Ghez, Mazeh, Bonnell (top)
Kroupa, Artymowicz, Lin (bottom)



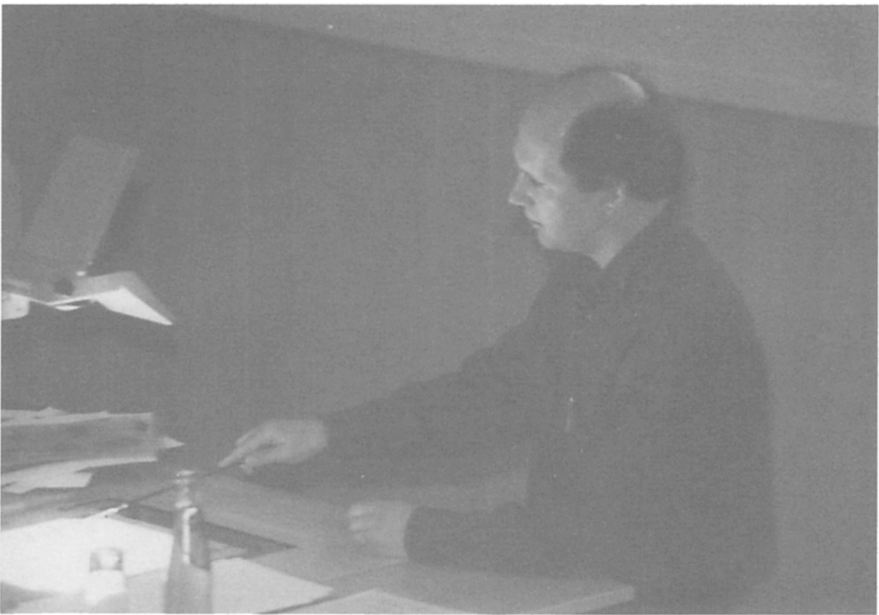
Theoreticians ...
Klein (top), Inutsuka (bottom)



Theoreticians ...
Bodenheimer (top), Burkert (bottom)



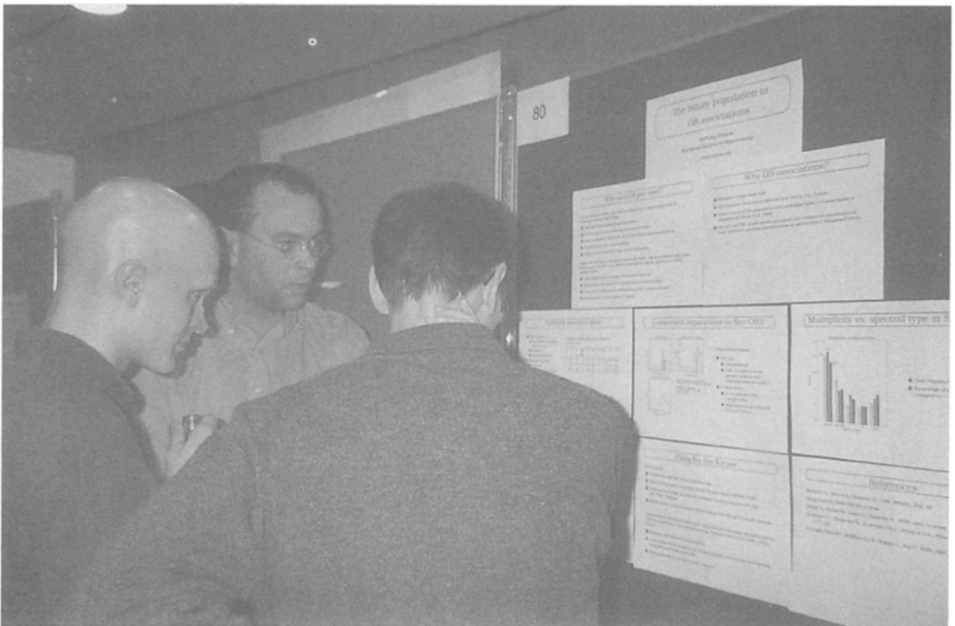
Observers ...
Duchêne (top), Brandner (bottom)



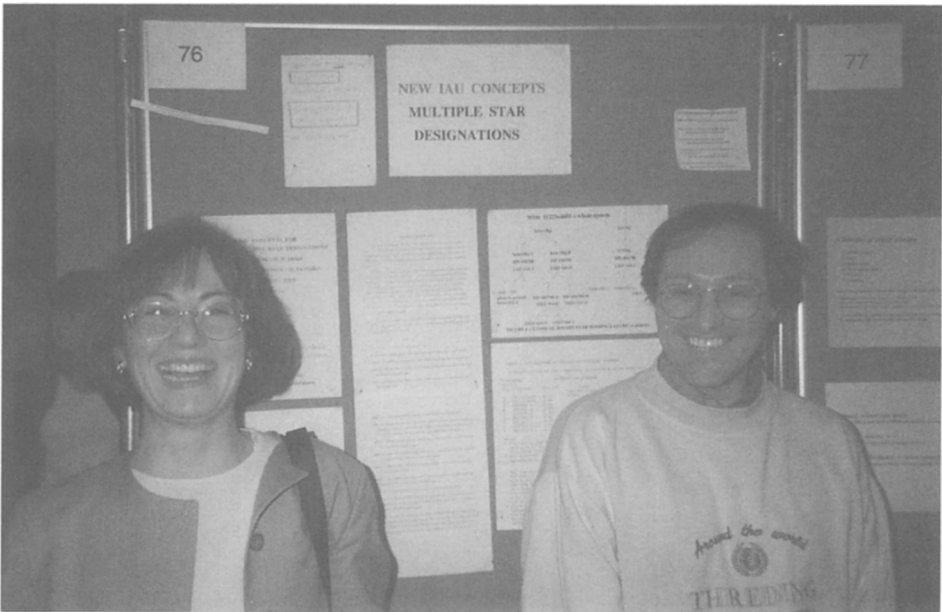
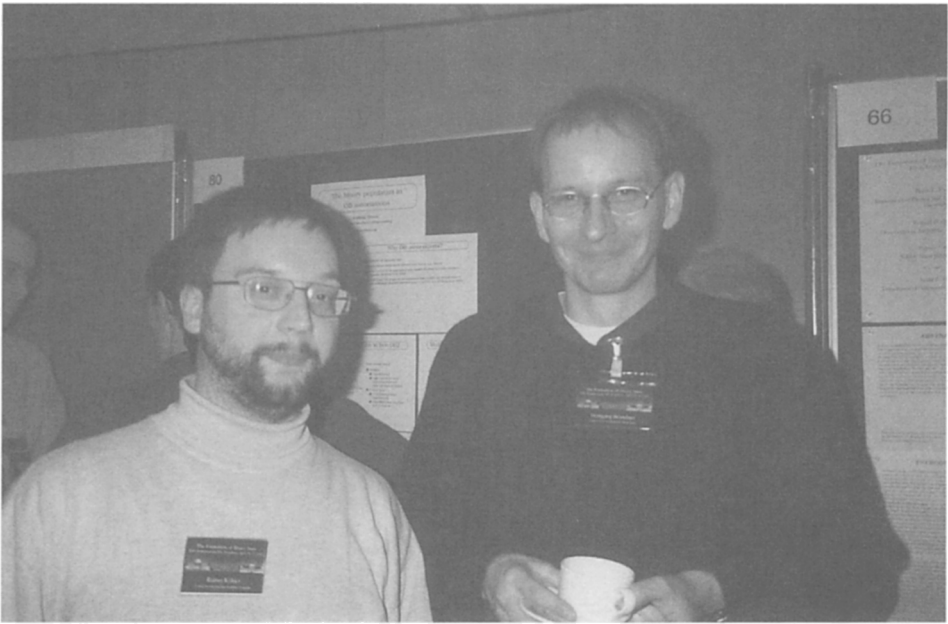
Observers ...
White (top), Preibisch (bottom)



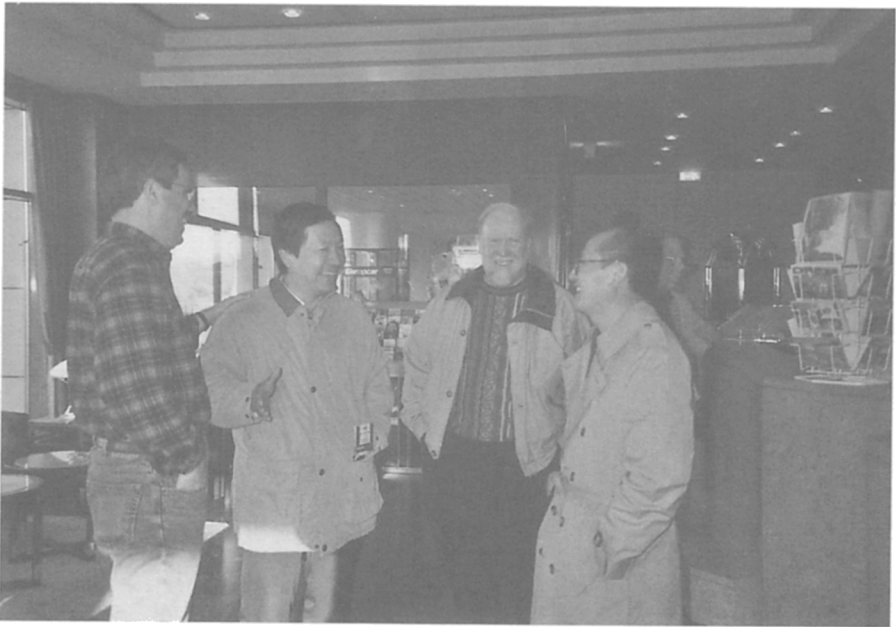
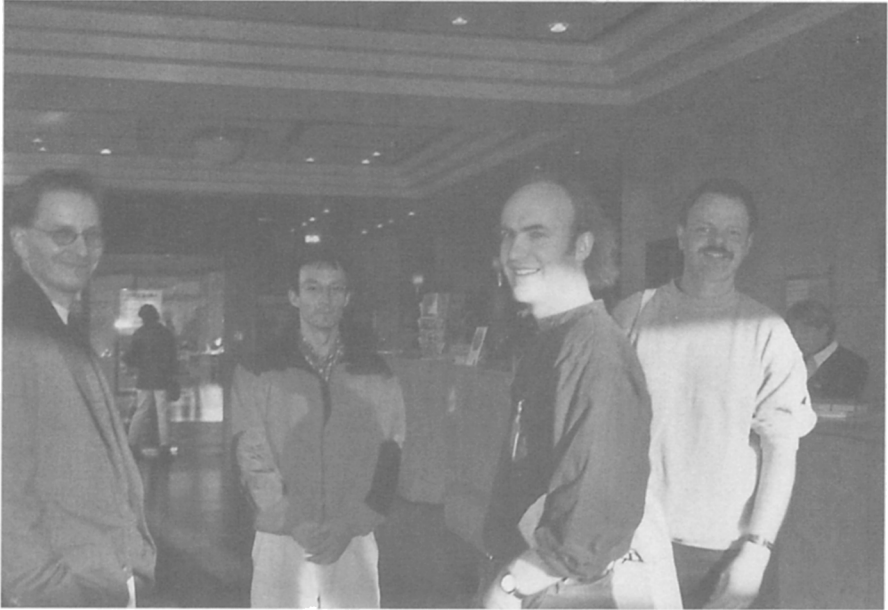
Larson talking to Wuchterl, Eislöffel and Baraffe (from left)



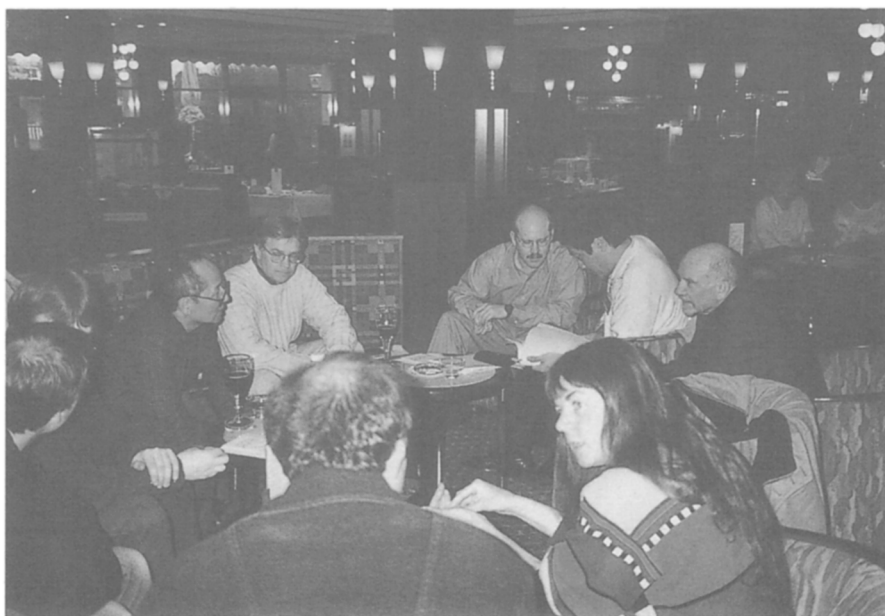
Anthony Brown explaining his poster to Shatsky and Tokovinin



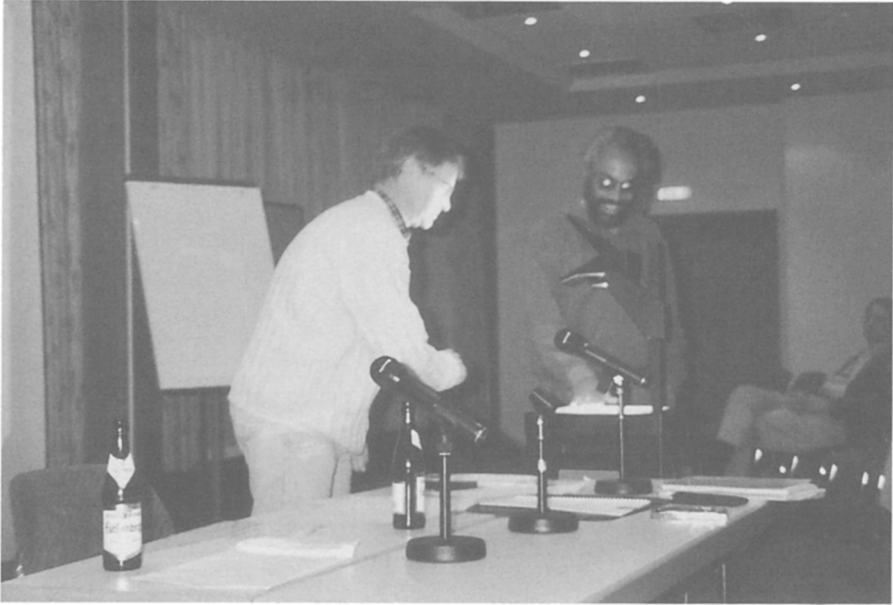
Happy co-authors:
Köhler and Brandner (top, from left)
Covino and Alcala (bottom, from left)



Happy people in the hotel Mercure lobby



Happy people in the hotel bar
Shu, Black, Lin (top, from left)
Shu, talking to Ebert (bottom)



Fun evening session:
Black and Basri during the session (top)
Discussion after the session (bottom)



top: The audience listening to the invisible speaker (Shu)
bottom: Flowers in the end ...



Bob arriving