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A new model for the Milky Way bar

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Abstract. We use Schwarzschild's orbit-superposition technique to construct self-consistent models of the Galactic bar. Using χ^2 minimisation, we find that the best-fit Galactic bar model has a pattern speed $\Omega_{\rm p} = 60$ km s^{-1} kpc^{-1}, disk mass $\rm M_d = 1.0 \times 10^{11} M_\odot$ and bar angle $\theta_{\rm bar} = 20^\circ$ for an adopted bar mass $\rm M_{bar} = 2 \times 10^{10} M_\odot$. The model can reproduce not only the three-dimensional and projected density distributions but also velocity and velocity dispersion data from the BRAVA survey. We also predict the proper motions in the range $l = [-12^\circ, 12^\circ]$, $b = [-10^\circ, 10^\circ]$, which appear to be higher than observations in the longitudinal direction. The model is stable within a timescale of 0.5 Gyr, but appears to deviate from steady-state on longer timescales. Our model can be further tested by future observations such as those from GAIA.

Keywords. Galaxy: bulge - Galaxy: centre - Galaxy: kinematics and dynamics

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