

THE ORBITAL ECCENTRICITIES OF BINARY MILLISECOND PULSARS IN GLOBULAR CLUSTERS

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Abstract. Low-mass binary millisecond pulsars are born with very small orbital eccentricities, typically of order $e_i \sim 10^{-6}$ – 10^{-3} . In globular clusters, however, higher eccentricities $e_f \gg e_i$ can be induced by dynamical interactions with passing stars. Using both analytical perturbation calculations and numerical integrations, we have shown (Heggie & Rasio 1996) that the cross section for this process is much larger than previously estimated. This is because, even for initially circular binaries, the induced eccentricity e_f for an encounter with pericentre separation r_p beyond a few times the binary semi-major axis a declines only as a power-law, $e_f \propto (r_p/a)^{-5/2}$, and *not* as an exponential. We find that all currently known low-mass binary millisecond pulsars in globular clusters must have been affected by interactions, with their current eccentricities being at least an order of magnitude larger than at birth (Rasio & Heggie 1995).

References

- Heggie D.C., Rasio F.A., 1996, MNRAS, submitted
Rasio F.A., Heggie D.C., 1995, ApJ, 445, L133