



# Luminosities of recycled radio pulsars in globular clusters

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(Submitted on 22 Jul 2011)

Using Monte Carlo simulations, we model the luminosity distribution of recycled pulsars in globular clusters as the brighter, observable part of an intrinsic distribution and find that the observed luminosities can be reproduced using either log-normal or power-law distributions as the underlying luminosity function. For both distributions, a wide range of model parameters provide an acceptable match to the observed sample, with the log-normal function providing statistically better agreement in general than the power-law models. Moreover, the power-law models predict a parent population size that is a factor of between two and ten times higher than for the log-normal models. We note that the log-normal luminosity distribution found for the normal pulsar population by Faucher-Giguère and Kaspi is consistent with the observed luminosities of globular cluster pulsars. For Terzan-5, our simulations show that the sample of detectable radio pulsars, and the diffuse radio flux measurement, can be explained using the log-normal luminosity law with a parent population of  $\sim 150$  pulsars. Measurements of diffuse gamma-ray fluxes for several clusters can be explained by both power-law and log-normal models, with the log-normal distributions again providing a better match in general. In contrast to previous studies, we do not find any strong evidence for a correlation between the number of pulsars inferred in globular clusters and globular cluster parameters including metallicity and stellar encounter rate.

Comments: Accepted for publication in MNRAS; 14 pages, 10 figures and 5 tables

Subjects: **Solar and Stellar Astrophysics (astro-ph.SR)**

Journal reference: MNRAS 418 (2011) 477

DOI: [10.1111/j.1365-2966.2011.19498.x](https://doi.org/10.1111/j.1365-2966.2011.19498.x)

Cite as: [arXiv:1107.4521](https://arxiv.org/abs/1107.4521) [astro-ph.SR]

(or [arXiv:1107.4521v1](https://arxiv.org/abs/1107.4521v1) [astro-ph.SR] for this version)

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[v1] Fri, 22 Jul 2011 14:12:16 GMT (277kb)

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