

Searching for isolated stellar-mass black hole candidates by analyzing the kinematics of their former companions in disrupted binary systems

Chmyreva L., Beskin G., Karpov S.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We performed a search for isolated stellar-mass black hole candidates based on the fact that more than 50% of radio pulsars have originated in binary systems, now disrupted, where the other component could have evolved into a black hole prior to the second supernova event in the system which caused its disruption. To this end, several relatively young isolated pulsars with known parallaxes fitting the selection criteria were traced back to their presumed birth locations. These areas were then analyzed for possible black hole candidates based on the astrometric, photometric, and spectral data available. We present the results for the first 4 pulsars in our sample, J0139+5814, J0922+0638, J0358+5413, and J1395+1616. Several possible candidates were selected for further analysis.

Keywords

black holes, kinematics, Radio pulsars

References

- [1] Batten, A. H. 1967, *Annual Review of Astron and Astrophys*, 5, 25
- [2] Beskin, G. M. & Karpov, S. V. 2005, *Astronomy and Astrophysics*, 440, 223
- [3] Bethe, H. A. & Brown, G. E. 1998, *Astrophys. J.*, 506, 780
- [4] Chmyreva, E. G., Beskin, G. M., & Biryukov, A. V. 2010, *Astronomy Letters*, 36, 116
- [5] Collinge, M. J., Strauss, M. A., Hall, P. B., et al. 2005, *Astron. J.*, 129, 2542
- [6] Duquennoy, A. & Mayor, M. 1991, *Astronomy and Astrophysics*, 248, 485
- [7] Girven, J., Gänsicke, B. T., Steeghs, D., & Koester, D. 2011, *Mon. Not. R. Astron. Soc.*, 417, 1210
- [8] Halbwachs, J. L., Mayor, M., Udry, S., & Arenou, F. 2003, *Astronomy and Astrophysics*, 397, 159
- [9] Hobbs, G., Lorimer, D. R., Lyne, A. G., & Kramer, M. 2005, *Mon. Not. R. Astron. Soc.*, 360, 974
- [10] Prokhorov, M. E. & Popov, S. B. 2002, *Astronomy Letters*, 28, 536