The Magnificent Seven: New limits on radio emission

V. I. Kondratiev[1,2*], M. A. McLaughlin[1,2], D. R. Lorimer[1,2], M. Burgay[3], A. Possenti[3], R. Turolla[4,5], S. B. Popov[6], and S. Zane[5]

[1]Department of Physics, West Virginia University, USA

[2]National Radio Astronomy Observatory, USA

[3]INAF - Osservatorio Astronomico di Cagliari, Italy

[4]University of Padua, Department of Physics, Italy

[5]Mullard Space Science Laboratory, University College London, UK

[6]Sternberg Astronomical Institute, Moscow, Russia

We have carried out a search for radio emission at 820 MHz from six X-ray dim isolated neutron stars with the Robert C. Byrd Green Bank Radio Telescope (GBT). All discovered in the *ROSAT* All-Sky Survey, these objects share very similar properties [1, 2] and are sometimes called the "Magnificent Seven" as their number has remained constant since 2001[†]. No transient or pulsed emission was found using Fast Folding Algorithm (FFA), fast Fourier transform, and single-pulse searches[‡]. The corresponding flux limits are about 20 mJy for single dispersed pulses and 0.01 mJy for pulsed emission, depending on the integration time for the particular source and assuming a duty cycle of 2%. These are the most sensitive limits to date on radio emission from X-ray dim isolated neutron stars. There is no evidence for isolated radio pulses, as seen in the newly recognized class of rotating radio transients [3, 4]. Our results imply that either the radio luminosities of these objects are lower than those of any known radio pulsars, or they could simply be long-period nearby radio pulsars with high magnetic fields beaming away from the Earth. To test the latter possibility, we would need around 40 similar sources to provide a 1σ probability of at least one of them beaming toward us.

References

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*E-mail: vlad.kondratiev@gmail.com

[†]The seventh object, RX J0420.0−5022, is not visible at the GBT and was not included in our study.

[‡]Our implementation of the FFA together with diagnostic plots for the single-pulse and FFA searches can be found at `http://astro.phys.wvu.edu/pulsar/vlad/projects/xdins`