The Magnificent Seven: New limits on radio emission

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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 \textit{ROSAT} All-Sky Survey, these objects share very similar properties \cite{Haberl2004, Haberl2007} and are sometimes called the “Magnificent Seven” as their number has remained constant since 2001\footnote{The seventh object, RX J0420.0−5022, is not visible at the GBT and was not included in our study.}. No transient or pulsed emission was found using Fast Folding Algorithm (FFA), fast Fourier transform, and single-pulse searches\footnote{Our implementation of the FFA together with diagnostic plots for the single-pulse and FFA searches can be found at \url{http://astro.phys.wvu.edu/pulsar/vlad/projects/xdins}}. 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 \cite{McLaughlin2006, McLaughlin2007}. 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 1\(\sigma\) probability of at least one of them beaming toward us.

References

\begin{itemize}
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\item \cite{Haberl2007} Haberl, F. 2007, Ap&SS, 308, 181
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