

PSR J1119–6127 and the X-ray emission from high magnetic field radio pulsars

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ABSTRACT: The existence of radio pulsars having inferred magnetic fields in the magnetar regime suggests that possible transition objects could be found. The discovery of such an object would contribute greatly to our understanding of neutron star physics. Here we report on the unusual X-ray emission detected from the radio pulsar PSR J1119–6127 using *XMM–Newton*. The pulsar has a characteristic age of 1,700 yrs and inferred surface dipole magnetic field strength of 4.1×10^{13} G. In the 0.5–2.0 keV range, the emission shows a single, narrow pulse with an unusually high pulsed fraction of $\sim 70\%$. No pulsations are detected in the 2.0–10.0 keV range, where we derive an upper limit for the pulsed fraction of 28%. The pulsed emission is well described by a thermal blackbody model with a high temperature of $\sim 2.4 \times 10^6$ K. While no unambiguous signature of magnetar-like emission has been found in high magnetic field radio pulsars, the X-ray characteristics of PSR J1119–6127 require alternate models from those of conventional thermal emission from neutron stars. In addition, PSR J1119–6127 is now the radio pulsar with smallest characteristic age from which thermal X-ray emission has been detected.