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Neutron star metamorphosis: from sub-luminous accretion to rotation-powered quiescence

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The X-ray transient IGR J18245-2452 contains the first neutron star (NS) seen to switch between rotation-powered and accretion-powered pulsations. We present Swift and Chandra observations that reveal a spectral transition when the X-ray luminosity was as low as 0.01% of the Eddington limit. We also find a striking variability pattern in the 2008 quiescent Chandra light curves: rapid switches between a high-luminosity 'active' state and a low-luminosity 'passive' state, with no detectable spectral change. We discuss these results in the context of slowly accreting compact objects and millisecond radio pulsars, and propose a scenario where the observed mode switches in quiescence are caused by fast transitions between the magnetospheric accretion and pulsar wind shock emission regimes.

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