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Searches for gravitational waves from pulsars

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Pulsars are promising sources of gravitational waves (GWs). While asymmetric mass distributions will produce continuos GWs, sudden relocations of small fractions of the internal neutron superfluid could produce transient GW emission. Such rearrangements are believed to be responsible for rapid accelerations in rotation, known as glitches, which have been observed in hundreds of pulsars. The search for pulsar generated signals in gravitational wave data is highly simplified by the use of precise knowledge of the rotational pulsar phase. Thus there has been a historical collaboration between pulsar observatories and gravitational wave astronomers. NICER regularly monitors several X-ray pulsars which are good candidates for GW emission. One of them is PSR J0537-6910, a highly energetic pulsar that exhibits large and frequent spin-up glitches. Not only glitches could be generating GWs in this pulsar but also r-mode oscillations in its interior. We will summarise our observations of this pulsar and the GW searches that we have done targetted at the emission generated by the aforementioned processes.

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