A neutron star with an unusual magnetic field structure

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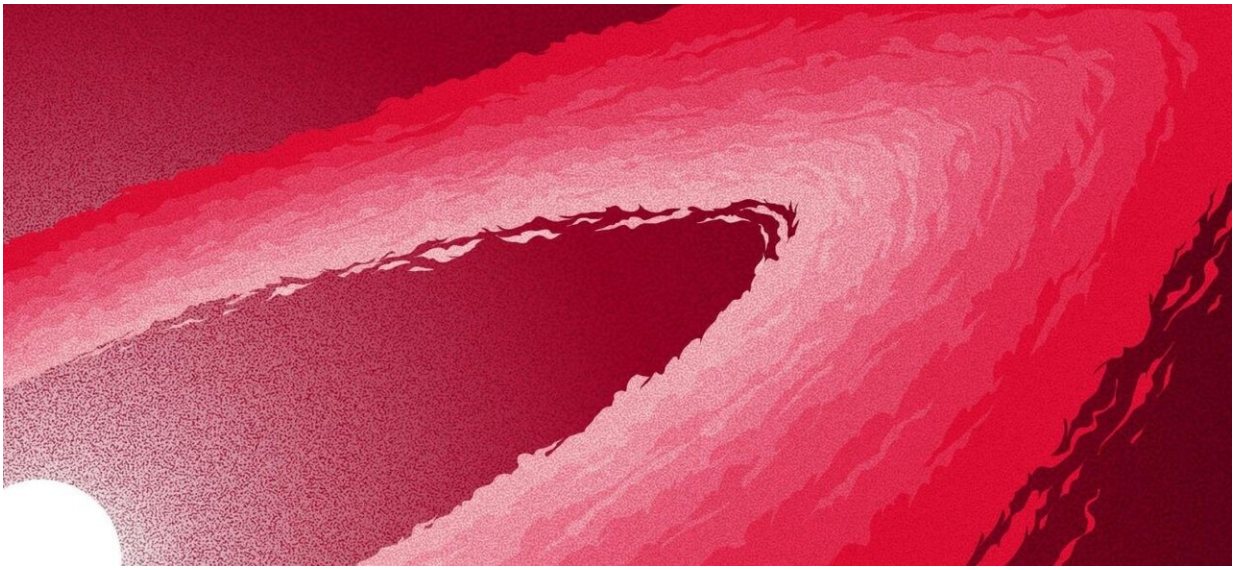

Russian scientists discovered a unique neutron star, the magnetic field of which is apparent only when the star is seen under a certain angle relative to the observer. The neutron star GRO J2058+42 studied by the researchers offers an insight into the internal structure of neutron star's magnetic field only at a certain phase of its rotational period. Credit: @tsarcyanide, MIPT

Scientists from Moscow Institute for Physics and Technology, Space Research Institute of the Russian Academy of Sciences (IKI), and Pulkovo Observatory discovered a unique neutron star, the magnetic field of which is apparent only when the star is seen under a certain angle relative to the observer. Previously, all neutron stars could be

grouped into two large families: the first one included objects where the magnetic field manifests itself during the whole spin cycle, and the other one included objects where the magnetic field is not measured at all. The neutron star GRO J2058+42 studied by the researchers offers an insight into the internal structure of a neutron star's magnetic field only at a certain phase of its rotational period. The work was published in the *Astrophysical Journal Letters*.

The neutron star in the GRO J2058+42 system was discovered almost a quarter of a century ago with the Compton Gamma-Ray Observatory (CGRO) in the USA. It belongs to the class of so-called transient X-ray pulsars. This object was studied using different instruments and nothing set it apart from other objects of its class. Only recent observations with the NuSTAR space observatory that has an outstanding combination of the high energy resolution (