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X-ray emission from isolated neutron stars: latest results from XMM-Newton, NICER and eROSITA

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The X-ray spectra of isolated neutron stars (INSs) typically include a thermal component, that comes from the cooling surface, and a non-thermal component, produced by highly-relativistic particles accelerated in the stellar magnetosphere. Hot spots from returning currents can also be detected.

Middle-aged pulsars exhibit a mixture of these components, but other flavours of INSs, that show a large variety of physical parameters (such as spin period, magnetic field and age) emit only thermal X-rays. These stars are usually detected either by large serendipitous datasets from pointed X-ray observations or from searches in the data of all-sky surveys.

The connection between these thermally-emitting INSs, the ordinary pulsars, and the new emergent class of pulsars characterized by a long period, that do not show X-ray emission despite their large magnetic field, is one of the current challenges in the study of neutron stars.

In this contribution I will review the latest results on several objects belonging to various INS classes, such as the XDINS RX J1856.5-3754, the enigmatic Calvera, the long period PSR J0250+5854 and the new thermal INS candidates, obtained with the X-ray observatories XMM-Newton, NICER and eROSITA.

Primary author: RIGOSELLI, Michela (INAF)

Presenter: RIGOSELLI, Michela (INAF)

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