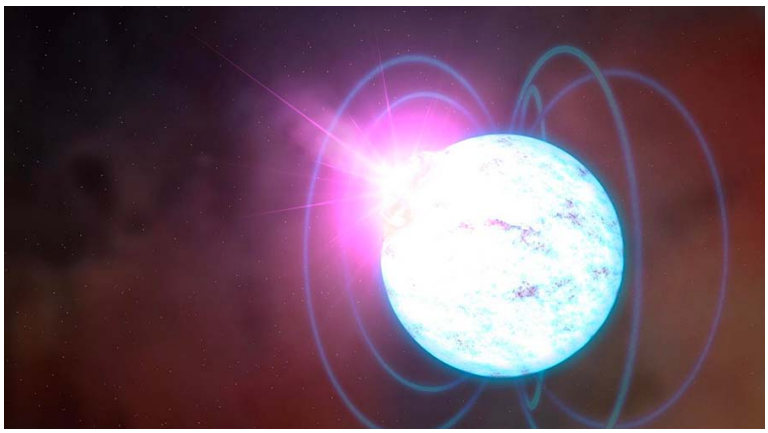
Press Release 2021

IXPE OBSERVES FOR THE FIRST TIME A MAGNETAR IN THE X LIGHT



A condensed atmosphere composed of heavy elements immersed in one of the strongest magnetic fields in the entire universe, from which intense flashes radiate sporadically. This is the most probable landscape that we would face as we approach a magnetar, an exotic celestial body belonging to the family of neutron stars. A scenario compatible with the measurements carried out by the IXPE satellite, the result of a collaboration between NASA and ASI Italian Space Agency, which is able to study for the first time the polarization of light in the X band, thanks to its innovative detectors developed, built, and tested by the INFN and the INAF National Institute for Astrophysics. This was announced by a study conducted by an international collaboration, which includes researchers from INFN, INAF, the University of Padua, University College London, and the University of British Columbia, as well as NASA and ASI, published on November 3 in the journal Science. Using the data provided by IXPE, the researchers were able to ascertain how the rate and angle of polarization of the X radiation emitted by 4U 0142 + 61, a neutron star in the constellation of Cassiopeia, varies with the variation of energy, validating some of the models that describe the physical processes that take place on the surface and in the magnetosphere of these astrophysical sources. The fraction and direction of polarization observed also carry the imprint of the structure of the magnetic field and the physical state of the surface and atmosphere of the neutron star, thus providing information not otherwise accessible with other observational techniques. Despite the agreement between the data and theoretical predictions, the IXPE Collaboration is continuing to explore alternative models to provide a complete picture of the physical mechanisms underlying magnetar emission.