

eROStars Project Proposal

Project title: Transitions in magnetic behavior at the substellar boundary

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Project description (~1-2 paragraphs):

Ultracool dwarfs (SpT later than M7) show either strong coronal-like X-rays with low radio luminosities or predominantly planet-like strong radio emission with low X-ray luminosities. This bifurcation is likely driven by the

properties of the magnetic field and the stellar rotation. We will investigate this hypothesis by means of new 11 UCDs combined with a literature compilation that have been observed previously in both wavebands, and with rotation periods from TESS light curves analysed by us and from the literature.

Dedicated X-ray observations were carried out with XMM-Newton during AO11, AO13 and AO19 cycles, while radio data are obtained with JVLA and ATCA.

eRASS observations of these object complement the X-ray data base, in particular because for 2 of the 11 targets the XMM-Newton observations were not carried out. Moreover, they allow us to study long-term changes in the coronal emission for those objects observed with different X-ray instruments.

Finally, we compute rotation periods from TESS light curves, and when no reliable period comes out from our period search procedure we adopt the upper limits calculated with $v \sin i$ measurements.

Keywords (optional): Ultracool dwarfs, stellar coronae, rotation

Project timeline: until the end of 2023

eROSITA dataset(s): eRASS1-4

(if applicable):

Required supporting datasets and/or tools: XMM-Newton and radio data have been obtained by us in GO programs at various telescopes. TESS light curves are publicly available.

Details of preparatory and/or follow-up proposals/tasks: N.A.

Expected data products: N.A.

Collaborative project with other WG: N.A.

Details of related grant proposals: N.A.

Details of related PhD/Master projects: N.A.