“Long Period Transient study with CHORD”

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Lieu : LPC2E Orléans

Source et détails sur le financement : ANR

Mots-clés : Radio astronomy, transient, pulsar compact object, signal processing, ML

Compétences nécessaires : Applicants should have an undergraduate and/or master’s degree in Astronomy (or closely related fields), full-time commitment, and a good command of the English language. Previous research experience is beneficial.

Sujet scientifique de la thèse :

Long Period Transients (LPTs) — an emerging and novel class of coherent radio sources that challenge our understanding of neutron star emission physics. Unlike canonical pulsars, which exhibit rotational periods of milliseconds to a few seconds, LPTs show periodic emission on timescales of tens of seconds to minutes and even hours. The discovery of LPTs is entirely unexpected; it has long been thought that as neutron stars spin down and gradually lose rotational energy, pair production and coherent radio emission should cease beyond the so-called “pulsar death line”. To date, only about a dozen LPTs have been uncovered, although the extreme intermittent nature of many of them suggests that many more such objects are yet to be detected. Understanding LPTs is critical for advancing models of neutron star magnetospheres, testing the limits of particle acceleration and plasma generation, and potentially uncovering evolutionary links between pulsars, magnetars, and other transient radio phenomena such as Fast Radio Bursts (FRBs). In order to increase the LPT sample size to obtain a more complete picture, we will exploit the plethora of data from the upcoming CHORD radio telescope, a next-generation facility currently being constructed in Canada which is expected to come online in 2027. Thanks to recent advancements in technology, CHORD will have two unique capabilities: an unprecedented sky mapping speed as well as daily repeated sky coverage, the two key ingredients for a successful transient survey. This project is fully funded by the ANR national grant. The PhD student will be involved in the development of signal processing algorithms, time series data processing and modeling, and/or the exploitation of Machine Learning (ML) based algorithms to reduce false positives caused by human-generated interference signals in the observational data as opposed to genuine astrophysical signals. At the end of the PhD, we expect the student to become fully proficient in radio astronomical signal processing and an expert in time domain data analysis, particularly in the area of pulsars and fast transients. The candidate will also take the lead on conducting a follow-up study of pulsar discoveries using the Nançay Radio Telescope (NRT) and the NenuFAR telescope at the Nançay Radio Astronomical

Observatory in France. The candidate will be hosted by the ASTRO team at the LPC2E in Orleans. The team boasts the largest pulsar research group in France and is closely affiliated with the Nançay Radio Astronomical Observatory in the Forest of Sologne. The candidate will also have the opportunity to travel to collaborate with other partnering institutes, as well as to present the research work at international conferences. A laptop will be provided, along with access to necessary computing resources. Candidates are invited to contact the supervisors (Cherry Ng-Guiheneuf, Gilles Theureau) to discuss further details. Application deadline: January 16, 2026 (Friday)

Informations complémentaires :

Required application materials: * Personal statement outlining applicant's motivation to train as a researcher in astrophysics, and in particular at LPC2E/CNRS, research experience (if any), research interests, and career plans and goals. * Curriculum Vitae (max 3 pages, including any publications) * Two reference letters