2018-00872 - Accelerating the CMB data analysis in astrophysics

Contract type : Public service fixed-term contract
Level of qualifications required : Graduate degree or equivalent
Fonction : PhD Position

Context
Collaborations with members of B3DCMB ANR project.

Assignment
This internship is in the area of data analysis of cosmological data sets as collected by contemporary and forthcoming observatories. This is one of the most dynamic areas of modern cosmology. Our specific target are data sets of Cosmic Microwave Background (CMB) anisotropies, measurements of which have been one of the most fruitful of cosmological probes.

The main objective of this project is to empower the CMB data analysis with novel high performance tools and algorithms superior to those available today and which are capable of overcoming the existing performance gap.

Main activities
The majority of the current CMB observatories perform observations by scanning the sky with a telescope, repeatedly revisiting the same sky areas and progressively covering a bigger and bigger part of the sky. The signal measured by arrays of thousands of detectors is registered at the constant rate of a few hundreds times per second over the periods of many years. CMB data analysis as collected by CMB instruments, known as the map making problem, can be modeled as a generalized least squares problem of very large scale. This thesis will focus on the robust and accurate resolution of this generalized least squares problem and its suitability for massive parallelism. Our goal is to develop communication avoiding preconditioned Krylov subspace iterative method for solving it, starting from the work in and using low rank approximation techniques.

Skills
Knowledge in numerical linear algebra and high performance computing.

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport

Remuneration
Poste localisé Paris 12ème.
Rémunération selon profil et expérience.

General Information
- Theme/Domain : Distributed and High Performance Computing
  Scientific computing (BAP E)
- Town/city : Paris
- Inria Center : CRI de Paris
- Starting date : 2018-10-01
- Duration of contract : 3 years
- Deadline to apply : 2018-07-31

Contacts
- Inria Team : ALPINES
- Recruiter : Grigori Laura / laura.grigori@inria.fr

About Inria
Inria, the French National Institute for computer science and applied mathematics, promotes “scientific excellence for technology transfer and society”. Graduates from the world’s top universities, Inria’s 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

Conditions for application
Defence Security : This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy : As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.