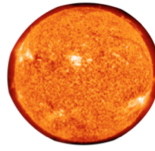




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WHOLE



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Title: Expert in High Performance Computing and/or Numerical Solar/Plasma Physics

Employer: CEA Paris-Saclay, IRFU/DAP

Contact name: Allan-Sacha Brun; Maxime Delorme

Contact email: allan-sacha.brun@cea.fr; maxime.delorme@cea.fr

Website: wholesun.eu

Where: CEA Paris-Saclay - Gif sur Yvette

Duration: 3 years

Remote work: Up to two days a week

Description:

The ERC Synergy WholeSun project is hiring an expert in high-performance computing for MHD and solar/plasma physics. The position is located at CEA/IRFU, astrophysics department on the plateau de Saclay near Paris in France. Typically, during the past few decades, solar physics research was focused towards studying the structure and dynamics of either the solar interior or of the solar surface/atmosphere. The WholeSun project's goal is to consolidate studies of these two broad solar regions by gathering several international solar physics teams, from five different countries : CEA/IRFU in France, MPS in Germany, Institutt for teoretisk astrofysikk in Norway and Physics Dept. in UOI in Greece and IAC in Spain. WholeSun wishes to tackle some of the key open problems in computational solar/plasma physics and MHD today like the so-called spot-dynamo paradox or coronal heating.

Since 2019, CEA Paris-Saclay/IRFU is heavily involved in the development of the new simulation code Dyablo dedicated to astrophysical plasmas on adaptive grids. Dyablo is aiming for the first exascale simulations of the Sun as a whole, from the radiative interior to the extended corona with a fine resolution of a few hundreds of kilometres at the surface of the Sun (and by extension solar-type stars). Dyablo is written in C++ and uses the state of the art parallel programming performance portability framework Kokkos. In order to push the solar/plasma simulations made in Dyablo to the next step, we are looking for a candidate in HPC for solar/plasma physics to implement various versions of radiative transfer methods in the code, relying on the short characteristics or moment methods to start with.

Activities:

- Contribute to the development of Dyablo, in particular in the implementation of numerical methods and algorithms dedicated to radiative transfer.
- Evaluate the methods and implementations by a series of tests by comparing both with published benchmarks and with our international collaborators that have implemented advanced radiative transfer treatment in HPC codes such as Muram, Bifrost or Mancha.
- Collaborate and communicate on the project with the in-house partners (main developers) and European colleagues. Participate to Whole Sun workshops and brainstorming meetings.

Profile:

- Masters or PhD in HPC, computer science, numerical methods or related topic
- Experience in developing with modern C++ (14/17 and over) and python
- Experience in developing on GPUs is appreciated
- General understanding of involved physics topics such as radiative transfer and MHD is also appreciated
- Knowledge of version control (git), job scheduling (slurm) and visualisation software/techniques (paraview) is a plus.

Salary: 35K€-50K€ gross annual depending on the experience and diplomas of the candidate.

Benefits: CEA provides good social/health system benefits, subsidised cafeteria and mobility support

Travel funds: The position comes with a travel budget of 6-8 k€/year to attend international and national HPC meetings and work collaboratively among the Whole Sun consortium.

Computing Infrastructures: The Whole Sun consortia has access to advanced local, national and European HPC systems with both cpus and gpus technologies.