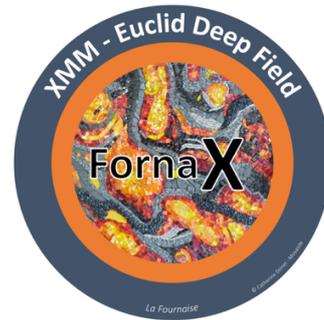


Marguerite PIERRE  
CEA Saclay  
Directeur de recherche  
[mpierre@cea.fr](mailto:mpierre@cea.fr)

Projet de thèse  
Début : 1/10/2026

Co-encadrement : François LANUSSE  
(CNRS - CEA Saclay)



---

**From the genealogy of dark matter halos to the baryonic properties of galaxy clusters  
and their cosmological interpretation**

**Abstract**

The thesis proposes to (1) predict the baryonic properties of galaxy clusters based on the history of dark matter halo formation, using innovative neural networks (Transformers) trained on hydrodynamic simulations. The aim is to then be able to emulate  $n10^5$  light cones extremely quickly for a wide variety of cosmological parameters and assumptions about baryon physics. (2) In a second step, the formalism developed will be incorporated into a cosmological inference software based on intensive simulations. (3) The whole will be applied to the cosmological analysis of samples of real galaxy clusters.

This project falls within the general framework of determining cosmological parameters through the observation of galaxy clusters in X-rays. It is directly linked to the international Heritage programme in the XMM-Euclid Fornax deep field.

We are seeking excellent candidates with good physical sense.

**Fornax project**

<https://fornax.cosmostat.org/>

For more information, interested applicants contact: [mpierre@cea.fr](mailto:mpierre@cea.fr)