Training Opportunity for Irish Trainees

Reference	Title	Duty Station
IE-2018-SCI-OOX(2)	**Development of tools for mission cross-calibration**	**ESAC**

Overview of the unit's mission:

The XMM-Newton Science Operations Centre (SOC) at ESAC is responsible for:

- Handling of Announcements of Opportunity and proposals for observations of the XMM-Newton X-ray mission, including technical evaluation and support to the Time Allocation Committee.
- Long- and Short-Term planning of observations, including instrument handling, calibration observations and Targets of Opportunity.
- Scientific calibration and analysis software development.
- Pipeline processing and data distribution.
- Scientific users support.

Overview of the field of activity proposed:

XMM-Newton is an ESA space observatory that collects X-rays from astronomical sources. It carries three high throughput X-ray telescopes with an unprecedented effective area. Each telescope has an X-ray CCD camera, comprising the European Photon Imaging Camera (EPIC). In addition XMM-Newton is also equipped with two Reflection Grating Spectrometers and an Optical Monitor.

About 25% of XMM-Newton observations are simultaneous or coordinated with other facilities (multi-wavelengths observations). With 3 Ms allocated time, simultaneous observations of XMM-Newton and NASA's NuSTAR mission are the leading joint effort. The scientific exploration of these data is constraint by residua calibration effects. Therefore, proper calibration of both mission and throughout cross-calibration is essential to take full advantage of the joint programs.

The successful applicant will develop a system of scripts, which allow to analyse NuSTAR observations and establish spectra of XMM-Newton and NuSTAR which are strictly simultaneous (common good time intervals), based on the existing analysis software for both missions. This system is supposed to be developed and documented in such a way that in the future it can be routinely used by XMM-Newton SOC scientists and be open to future inclusion of data from other missions.

Based on the extracted spectra the difference between the calibrations of the two instruments should be established for several sources. Depending on the interest of the applicant and progress, a simultaneous observation may be scientifically analysed and published.

In the course of this project, the Trainee will gain experience in systematic X-ray data reduction and analysis, calibration methods and cross-calibration challenges. She or he will also learn about the scientific uses of X-ray satellites and the challenges and procedures of operating a space mission. The project would be a valuable training for involvement in upcoming or future X-ray missions.

Required education:

Master's degree in science or engineering discipline. A background in astrophysics would be desirable.
Experience with Linux at user level is strongly preferred; scripting experience would be a bonus.
Some experience with Python, IDL, the XMM-Newton or NuSTAR analysis software is desirable.