

457.19: Study of Background Rejection Systems for the IXO Mission

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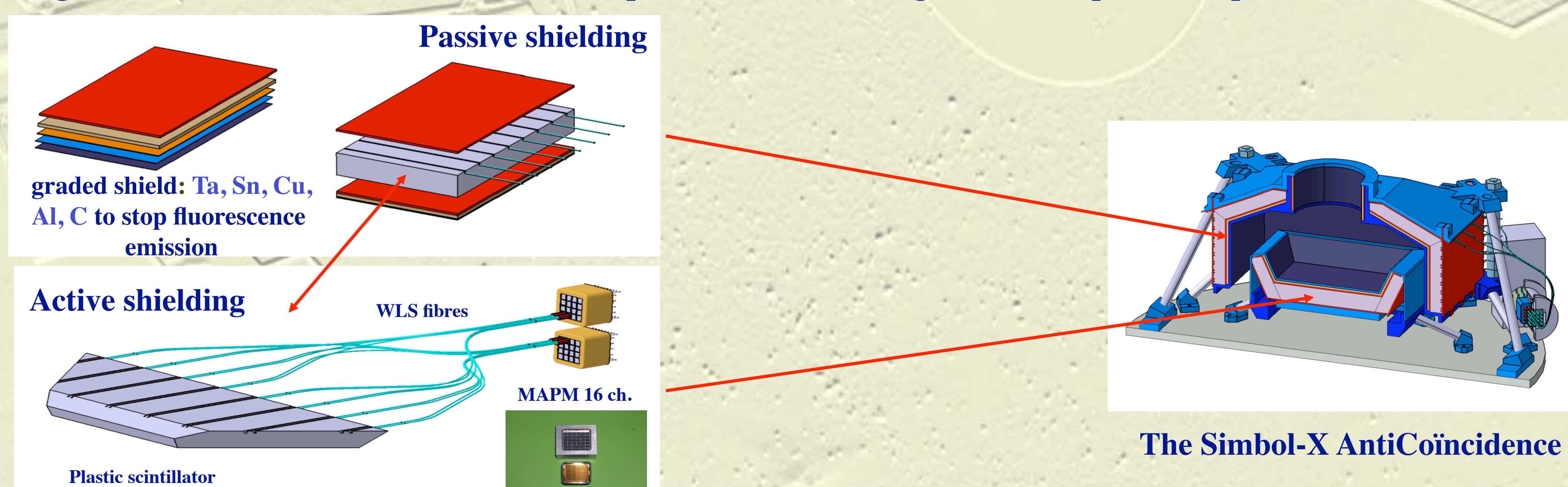
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The scientific performances of the IXO mission will necessitate a very low detector background level. This will imply thorough background simulations, and efficient background rejection systems. It necessitates also a very good knowledge of the detectors to be shielded. In APC, Paris, and CEA, Saclay, we got experience on these activities by conceiving and optimising in parallel the high energy detector and the active and passive background rejection system of the Simbol-X mission. Considering that this work may be naturally extended to other X-ray missions, we have initiated with CNES a R&D project on the study of background rejection systems mainly in view the IXO project. We will detail this activity in the poster.

Past and present missions heritage

Integral/IBIS: Anticoincidence optimization, background simulations and measure, experience feedback.

Simbol-X: Background simulations, anticoincidence conception (with 2 shielding, active and passive), optimization, and realization:

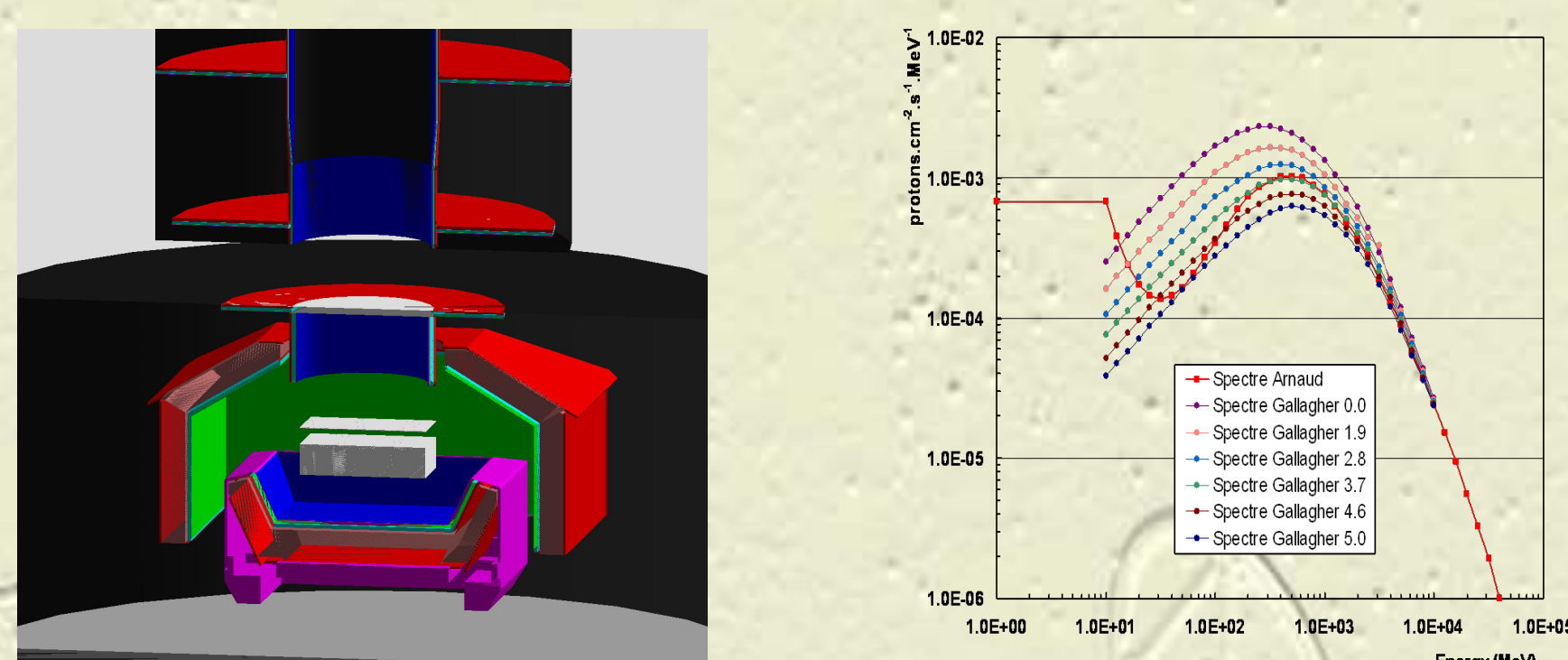


APC/CNES R&D for IXO background rejection systems: 3 main axes of research

In the framework of the HXI instrument for IXO, we have contacted our Japanese colleagues from Tokyo University and JAXA. The principle of a collaboration has been well considered by both sides, and it was envisaged to collaborate on the three following topics:

1. CdTe detectors and their front-end electronics (see O. Limousin et al. poster #451.17, this conference).
2. Background simulations.
3. Background rejection systems for IXO.

The R&D program for studying point 2 and 3, that we describe in this poster, have been granted by CNES for the 2009-2012 period.



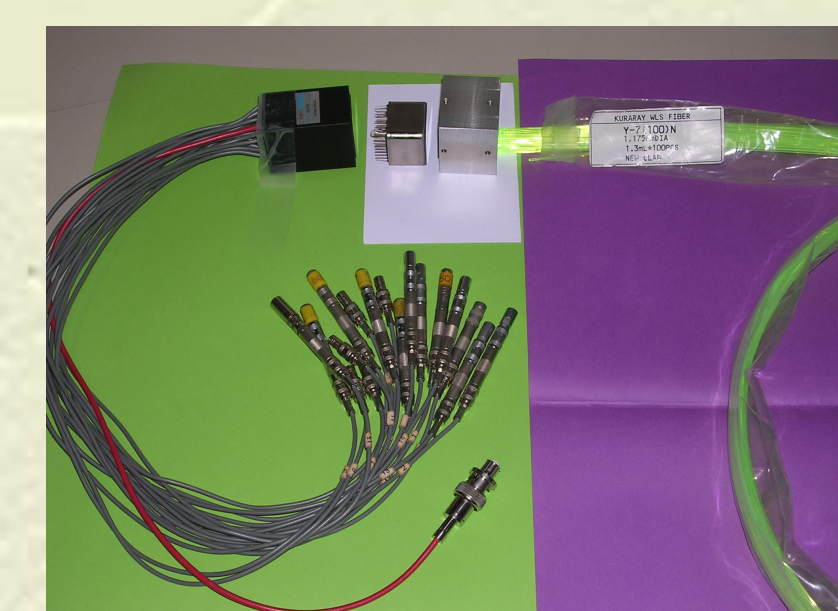
1: simulations

We aim to simulate the full chain from the spatial environment to the data treatment using :

- Cosmic environment simulators, for given period and orbits.
- Detector simulators (Geant 4).
- On-board data treatment simulators (C++).
- On-ground data reduction simulators (C++).

2: photo-detectors tests

Following what is done for Simbol-X, we wish to test photo-detectors (NaI, BGO, LaBr3) and ASICs, to realize mock-ups to optimize their properties (light output, speed, consumption, ...) in view of a possible IXO background rejection system.



MAPM (MultiAnod Photo-multiplier) + fibres assembly



Tandem accelerator, IPN, Orsay, France

3: accelerator tests

We will test our mock-ups in « real » conditions in particle accelerators (CERN, IPN Orsay, GSI, ...) in order to verify the estimates we derived by simulations.