BTF request for testing the DEAR Silicon Drift prototype detector

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Scientific goal:

The next phase of the DEAR precision measurements of the strong interaction effects in kaonic deuterium, is intended to be performed by using a new detection apparatus, based on timed large area Silicon Drift Detectors (SDD), with good energy and time resolution to detect X rays.

The strategy is to take advantage of both energy and time resolution of spectroscopic SDDs and to enlarge the area of usage of these detectors in a triggered application. This will give the possibility to detect the rare kaonic deuterium transition events, even in a high background environment.

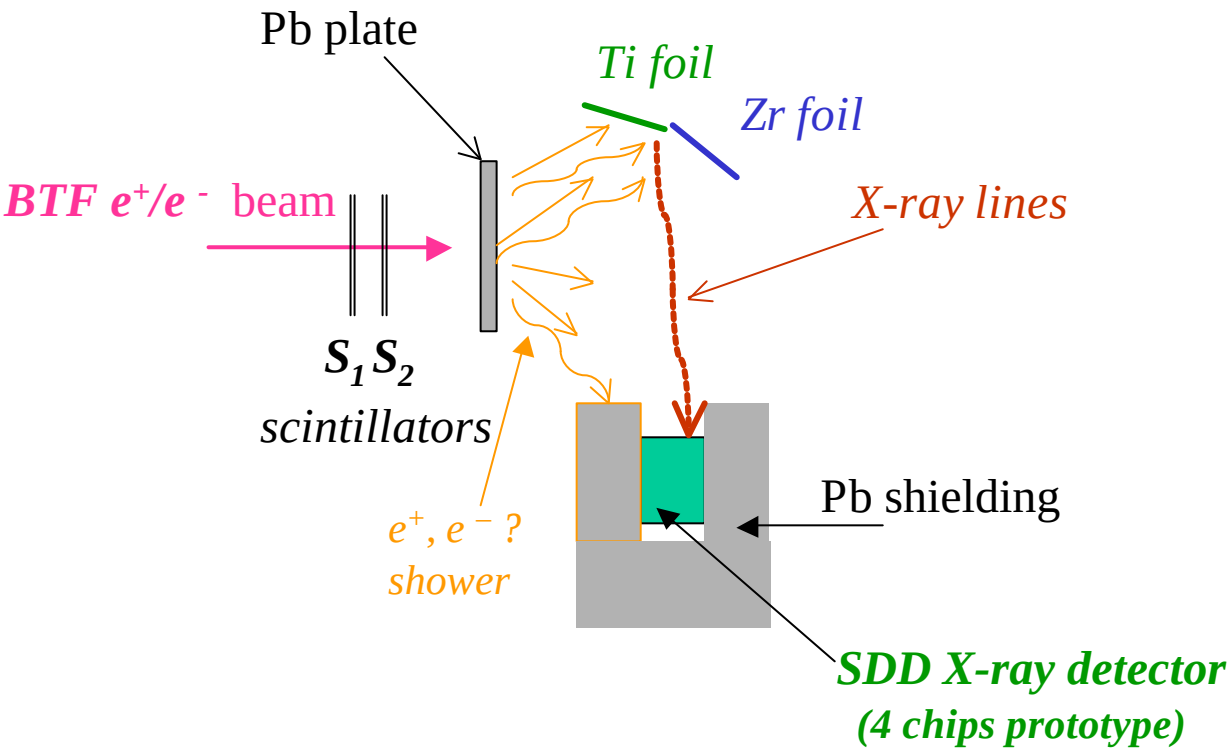
Operations:

The first stage of the project of the new detector deals with the characterization of the SDD performances.

The characterization concerns the finalization of trigger efficiency and energy resolution, as a function of background environment and time window. This information will fix also the dimension of the single cell. These measurements are planned to be performed with a prototype device. The answers coming from these tests will be used for the construction of the final detector array and associated electronics with optimal characteristics.

Prototype setup for tests at BTF:

The e^+/e^- BTF primary beam generates a shower in a lead plate. The *e.m.* e^+, e^-, ? cascade particles produce X-ray electronic excitations, in the 5-15 keV energy range, hitting *Ti* and *Zr* thin foils. These fluorescence signals are detected by four silicon drift chips. The charge generated in the detector is integrated within a time window provided by a gate given by the coincidence signal of two scintillators S_1 and S_2 put on the primary beam.



Beam required from BTF:

The following beam conditions at **BTF** are needed to perform full testing of the SDD – prototype:

Energy: varying between 50 ÷ 750 MeV

Intensity: varying between 1÷ 10^3 e^+/e^- s^{-1} *(preference is for positrons)*

?$_{bunch}$: ? 10 *ns;* *bunch frequency*: 1 ÷ 49 *Hz*

Gate window (if possible): 0.1 – 1 ? s

BTF run period required:

2-4 weeks in the period June 2003 - October 2003

Work with other projects (i.e. not as Main User) to be studied