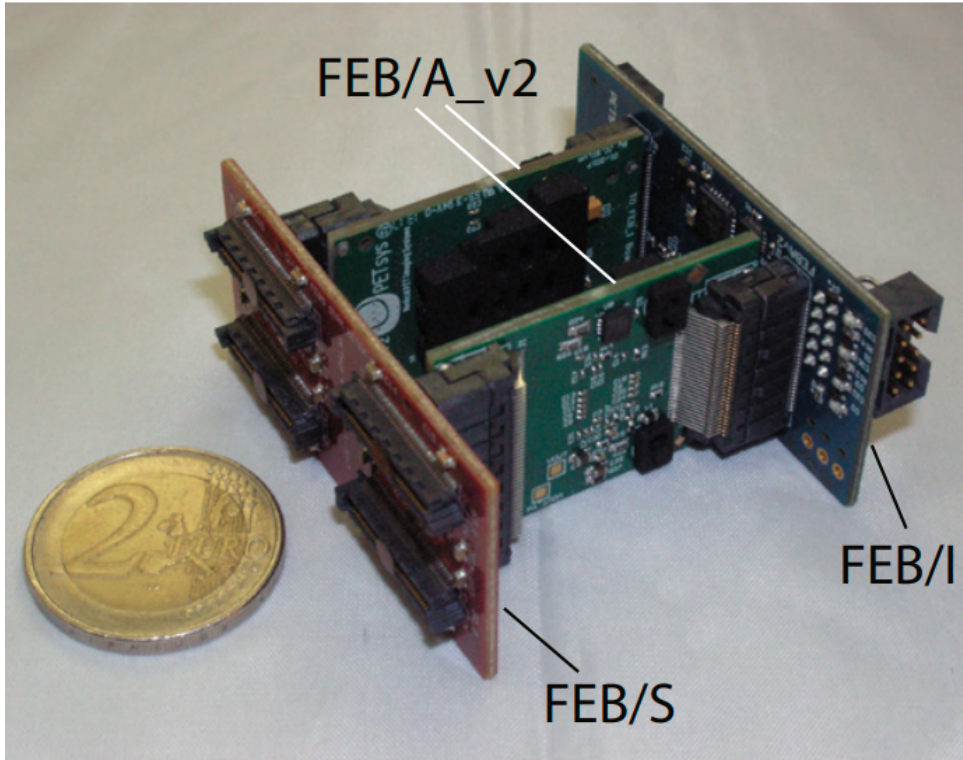


# 1 Readout

Foreseen is a readout with the TOFPET ASIC by PETsys Electronics. However there have been no significant developments towards implementing the readout system for the B-ToF detector.

The readout system consists of two main stages. The first stage consists of an assembly of small analog boards as seen in Fig. 1, the FEB/A, which is part of the *front end readout system*, holding the TOFPET ASIC, which converts the incoming signal into digital charge and timing information. Two of these boards each carrying a single TOFPET ASIC connect to the FEB/I and FEB/S boards forming *Front-End-Module 128* (FEM128), which is depicted in Fig. 1.



**Figure 1:** Connection of the FEB/A to the FEB/S and FEB/I.

The FEB/S is almost purely passive and acts as an adapter between the connection scheme of the sensors and the ASIC boards. It however is also equipped with a temperature sensor to monitor the SiPM's arrays which are supposed to be attached directly to the board. The FEB/I however is equipped with a MAX 10 Altera FPGA to manage the temperature sensors and the communication between the ASICS and the readout.

A second version of the Front-End-Module, the FEM256, shown in Fig. 2 equipped with four TOFPET ASIC's is also available for systems with a lower event rate. It is only capable of delivering 300 kcps which is more than enough for the up to 40 kHz per channel average hit rate in the forward region of the detector.

The second stage is a digital board, the FEB/D, to which up to 8 Front-End-Modules can be connected and which can be daisy-chained with other FEB/D boards for simple control. If the number of channels grows beyond 1024 channels two additional boards, the *DAQ Board* and the *Clock&trigger Module*, are required for the readout.

The c&t module acts as the central connection hub for up to 16 FEB/D boards and provides the system reference clock. For the synchronization with external systems it can accept external clock and synchronization signals. It connects to the DAQ Board the

