ISIS plans

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Abstract

This memo summarises a presentation at the EUDET annual meeting of October 8-10th 2007 on the progress with In-situ Storage Image Sensor Devices by the Linear Collider Flavour Identification Collaboration. Plans for test beam work at DESY are also presented.

1 Introduction

The Linear Collider Flavour Identification (LCFI) Collaboration [1] is investigating technology for vertex detectors at a future linear electron-positron collider. One technology under investigation is the In-situ Storage Image Sensor (ISIS) Devices. This memo describes preliminary results and plans for testing “proof of principle” ISIS devices

2 Cool Stuff

2.1 Principles of the ISIS Device

ISIS devices store signal charge in buried channel storage registers during the bunch train. The charge to voltage conversion is performed outside the bunch train and this should make them insensitive to EMI. Charge will be stored at 20kHz during the bunch train and readout at 1MHz.

2.2 Proof of Principle Device

A proof of principle ISIS device has been manufactured by e2V. This device has an array of 16×16 ISIS cells each of which is 40×160μm^2. Each cell can store charge in 5-pixels. The overall chip size is 6.5×6.5mm^2 but the fiducial region for each chip is 0.56×2.24mm^2.

The proof of principle ISIS device has been tested by the LCFI collaboration and signals seen using an ^{55}Fe source. Figure 1 shows the Signal to noise ration for pixels in each of the 5 memory cells. Signals can be seen in all 5 memory cells although cell 4 is noisy.

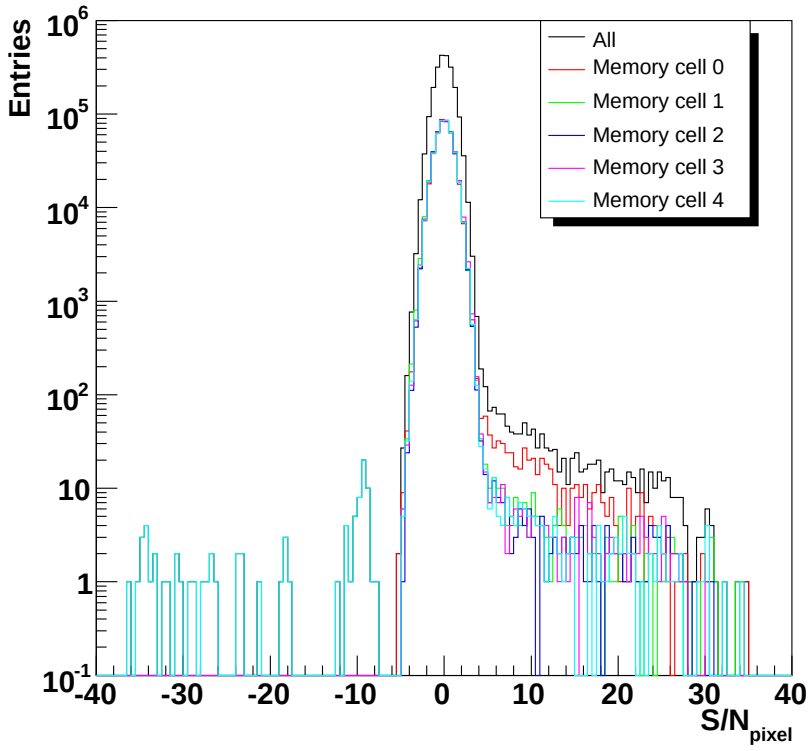

Figure 1: Signal to noise ratio observed in the proof of principle ISIS device with an ^{55}Fe source.

2.3 Test Beam Plans

The LCFI collaboration planned three weeks of test beam at DESY using five proof of principle ISIS devices. At the time of writing these tests have been completed and data analysis is in progress. A carrier board without the ISIS chip and the mounted ISIS chip are shown in figure 2.

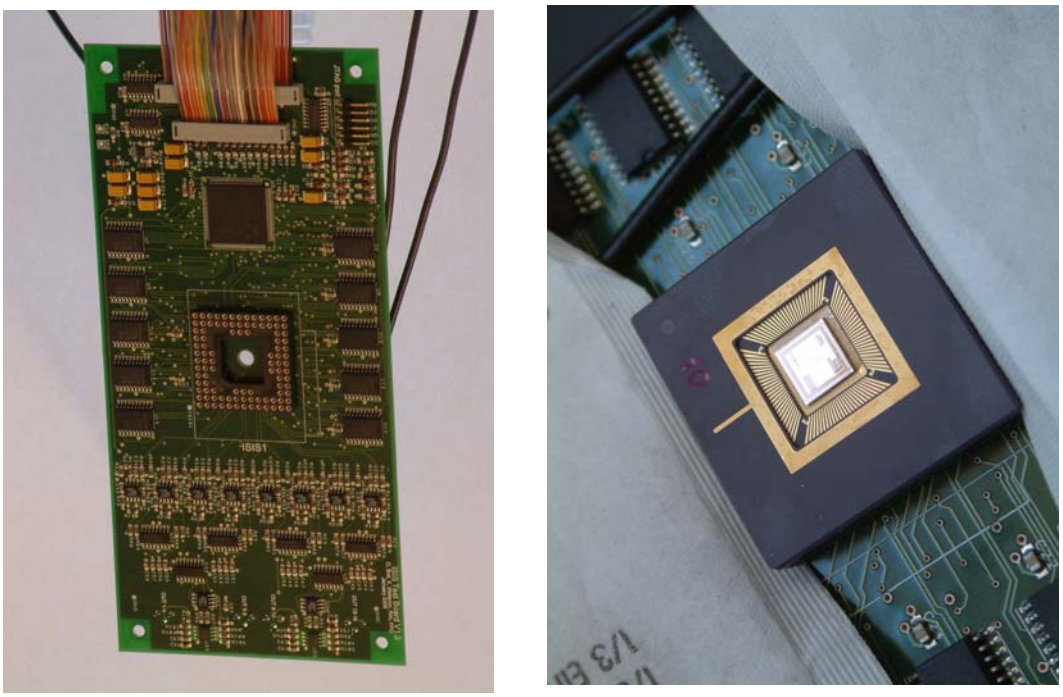

Figure 2 The carrier board without ISIS chip showing the hole for the beam (left) and the ISIS chip mounted in position on the board (right).

The five ISIS sensors are mounted in a metal box with precision alignment. The devices will be cooled to -15°C for operation in a 6 GeV electron beam. The setup is triggered by a coincidence between scintillators.

The Base VME module (BVM) delivers the control signals to the ISIS chips and the chips are readout by 14 bit ADCs. Data is written to disk locally.

3 Conclusion

A proof of principle ISIS device has been developed by e2V and the LCFI collaboration. Preliminary tests of this device with an ^{55}Fe source are encouraging and preparations for beams tests at DESY have been completed.

Acknowledgements

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References

1) LCFI Case for Support http://hepwww.rl.ac.uk/lcfi/lcfi_3_proposal.pdf.