

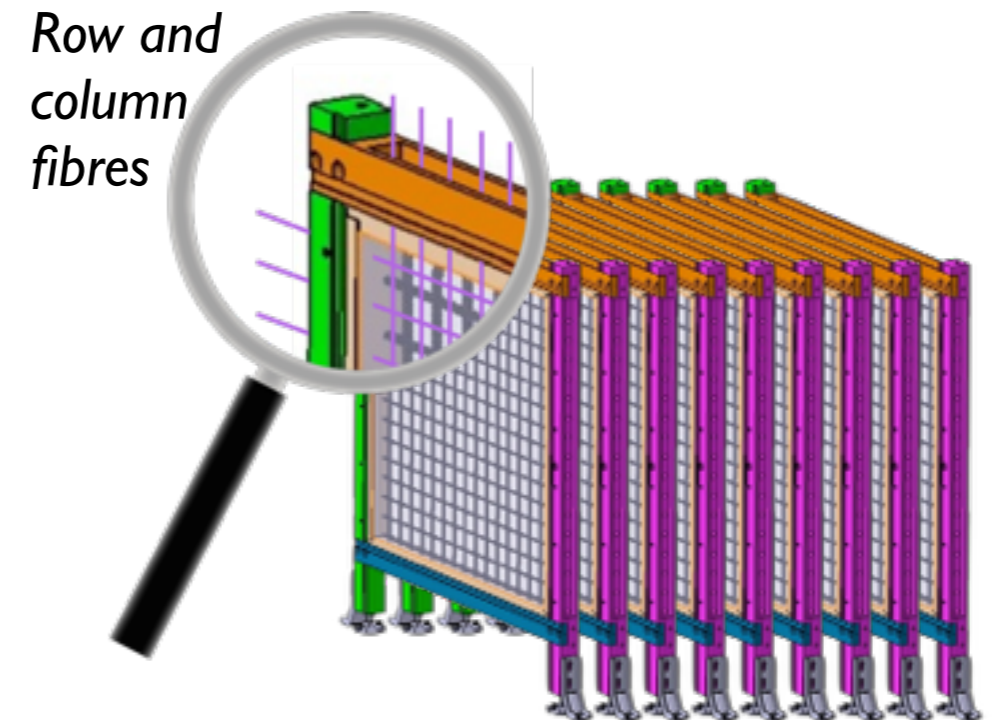
SoLiD Readout

Jim Brooke, University of Bristol UK
(with thanks to D. Cussans, D. Newbold, D. Saunders)

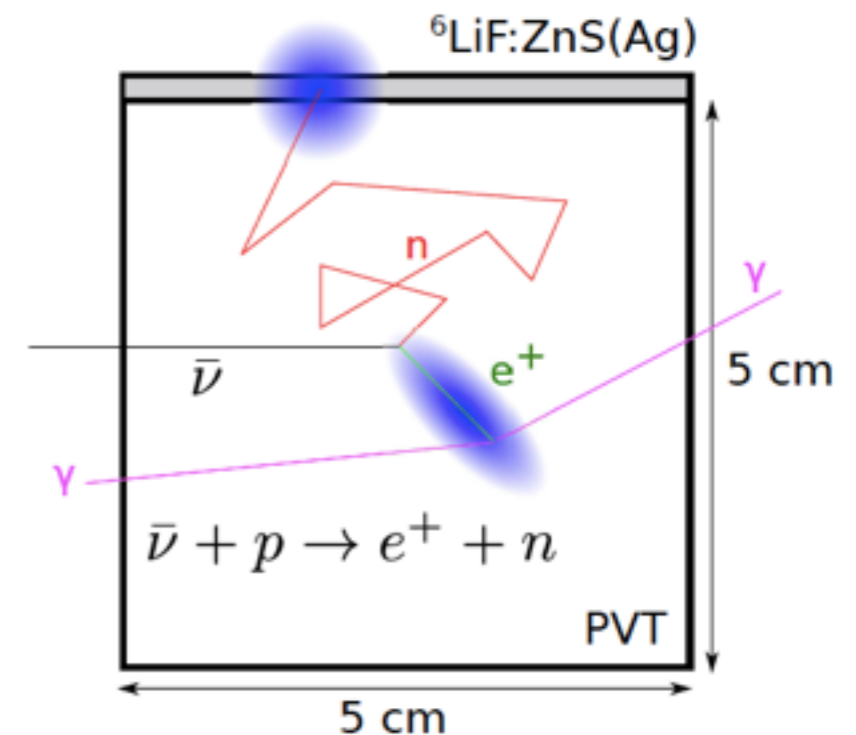
MilliQan kickoff meeting, NYU, 8-9th Oct 2015

SoLiD

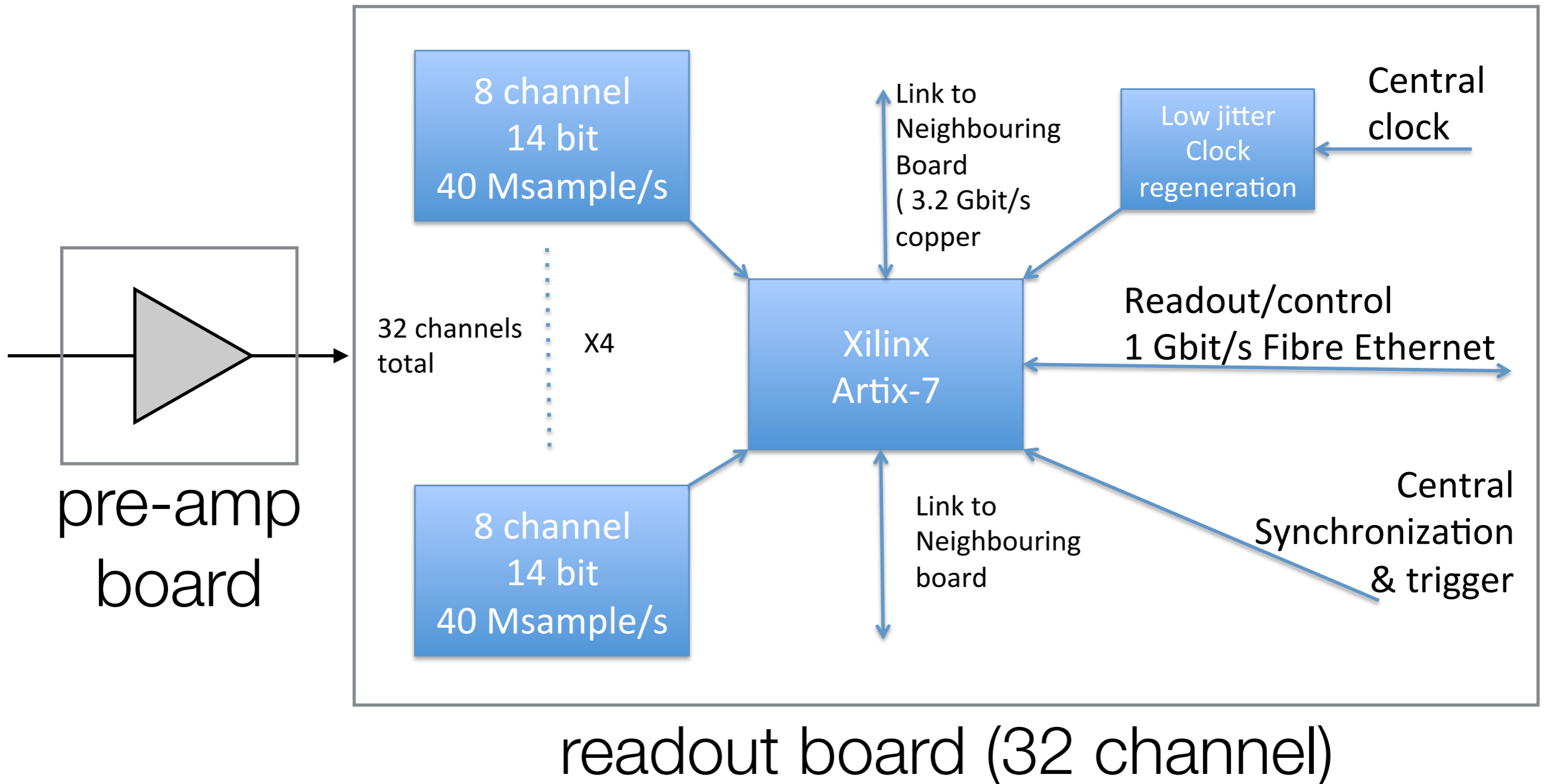
- ~5m baseline neutrino oscillation experiment at BR2 reactor (Belgium)
- Aims to address the reactor neutrino anomaly
- Highly segmented scintillating detector
 - 10,000 5cm PVT cubes
 - ^6Li for neutron signal
- Prototype test this year - 2000 cubes



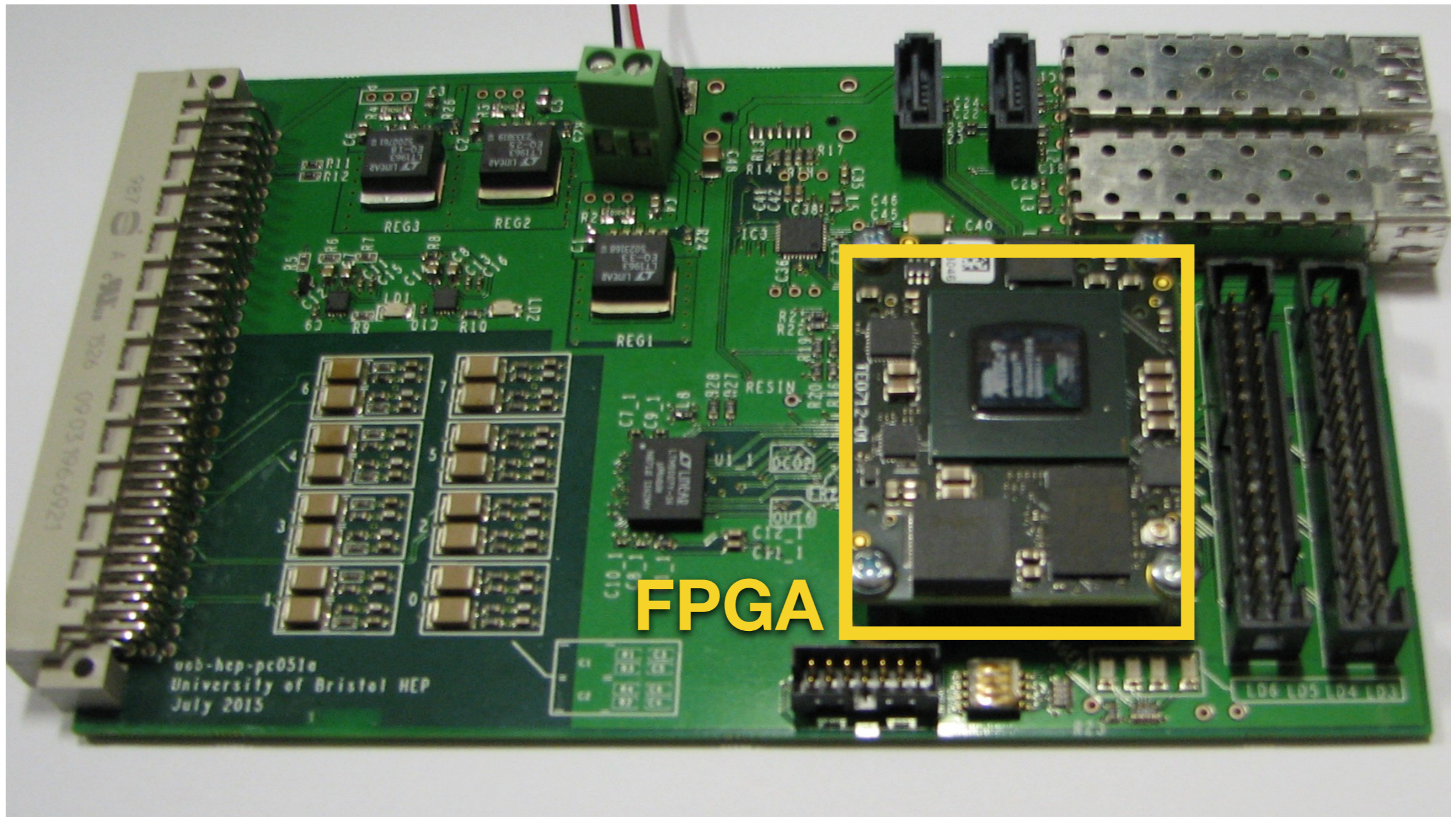
SoLiD prototype geometry: 9 arrays, each containing 15x15 scintillating cubes (5cm side).



SoLiD Readout

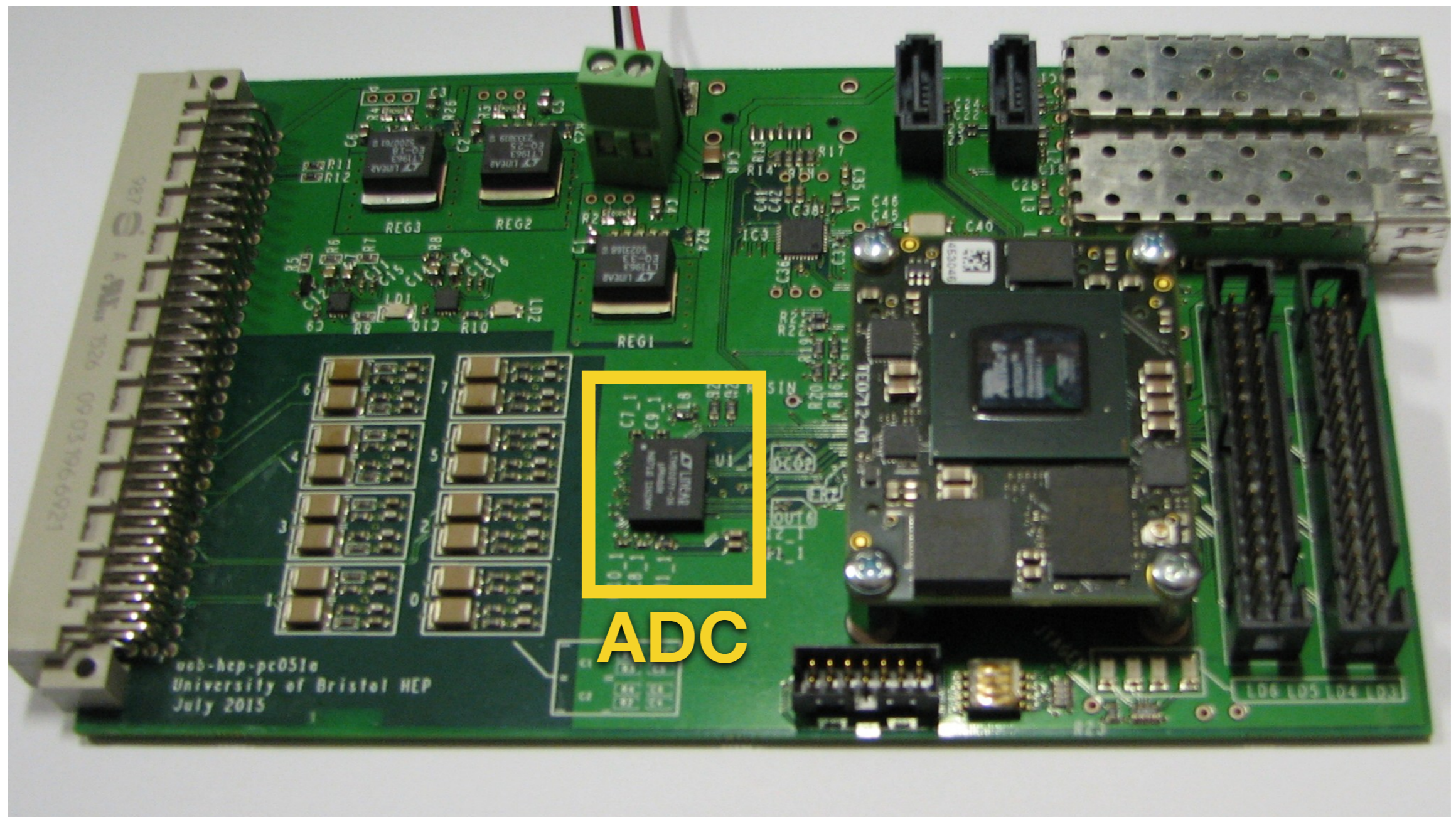


SoLiD Readout



8 channel prototype

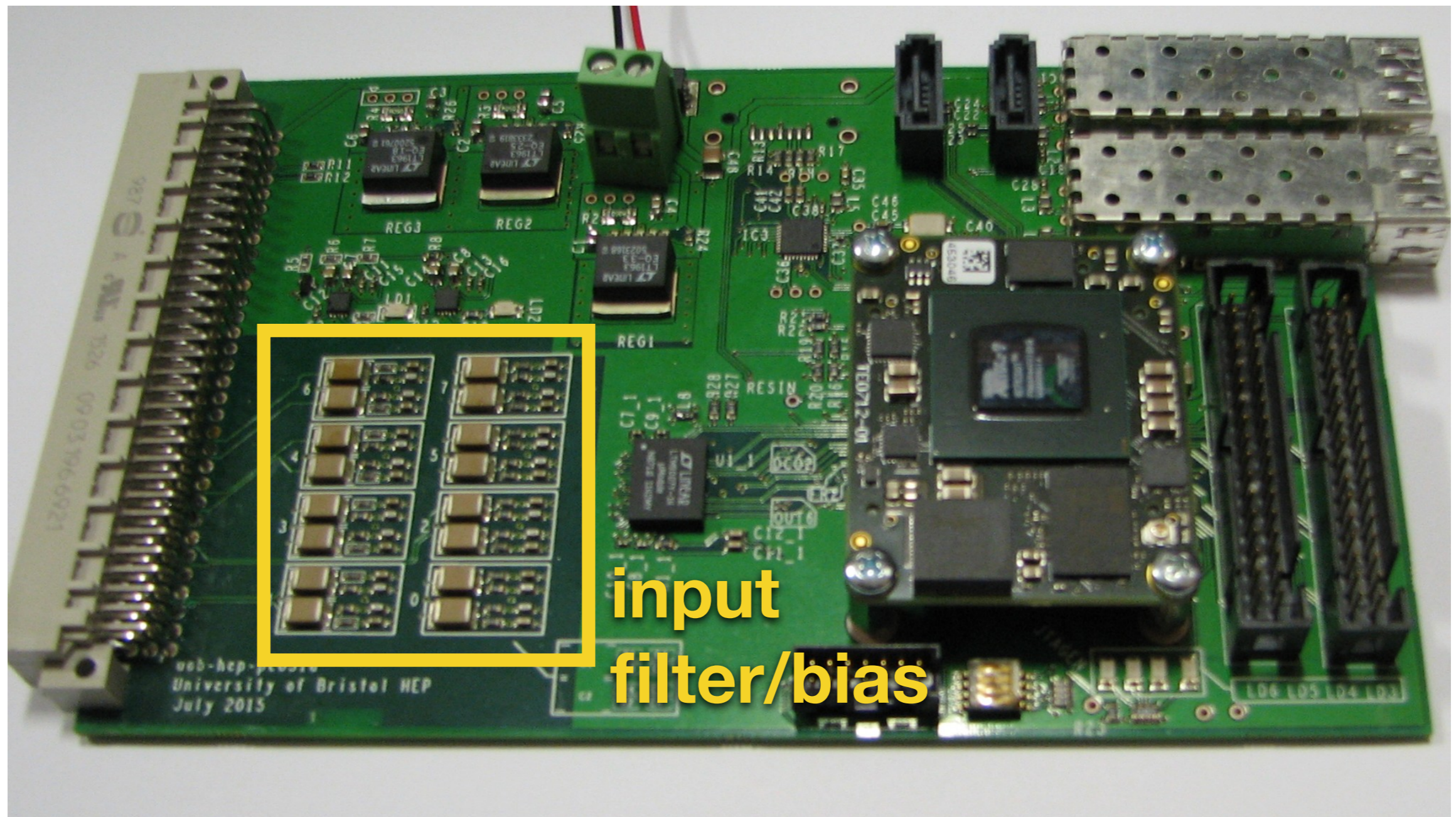
SoLiD Readout



8 channel prototype

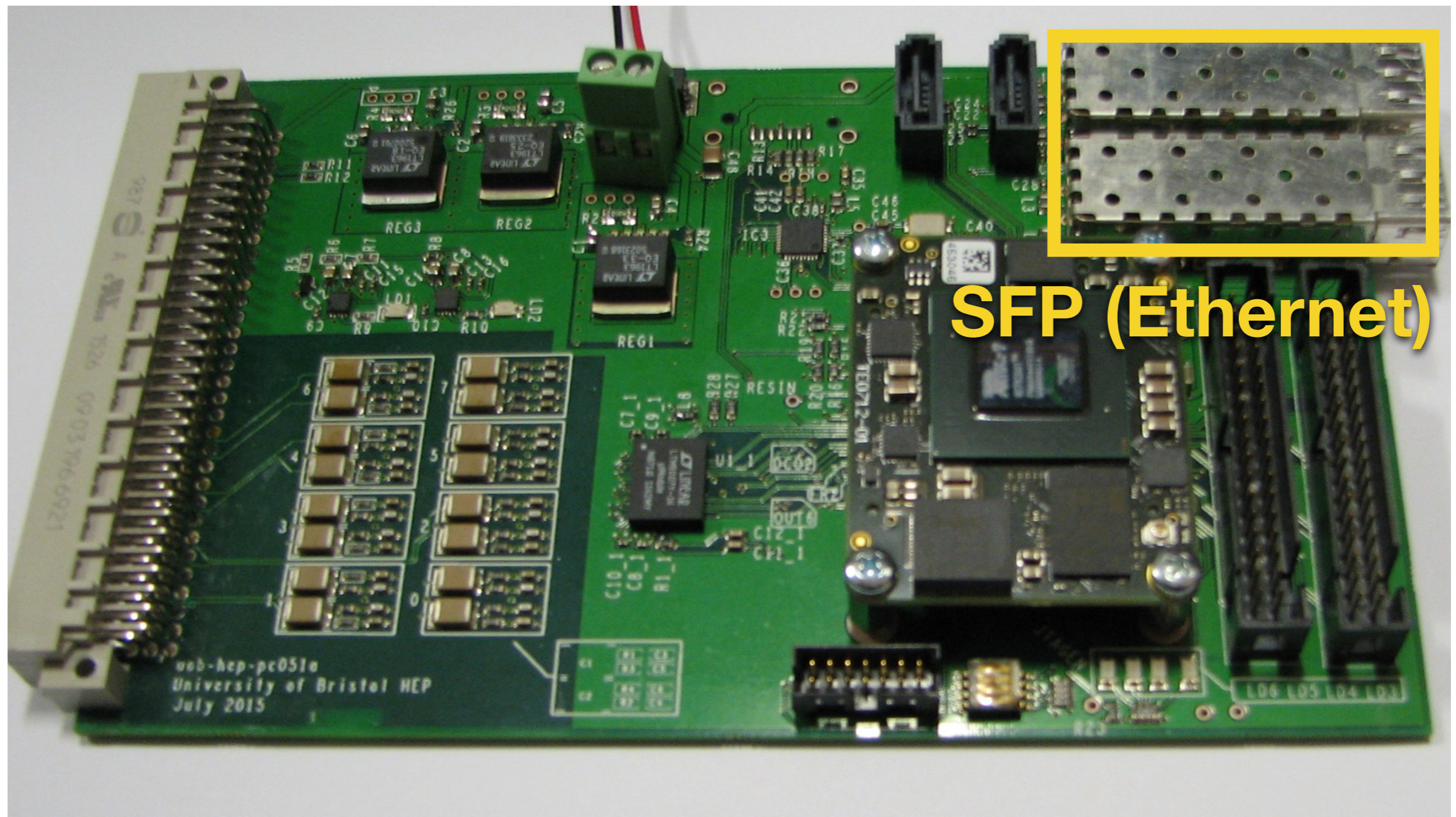
40 MSa/s ADC
But 100 MSa/s part may be compatible

SoLiD Readout



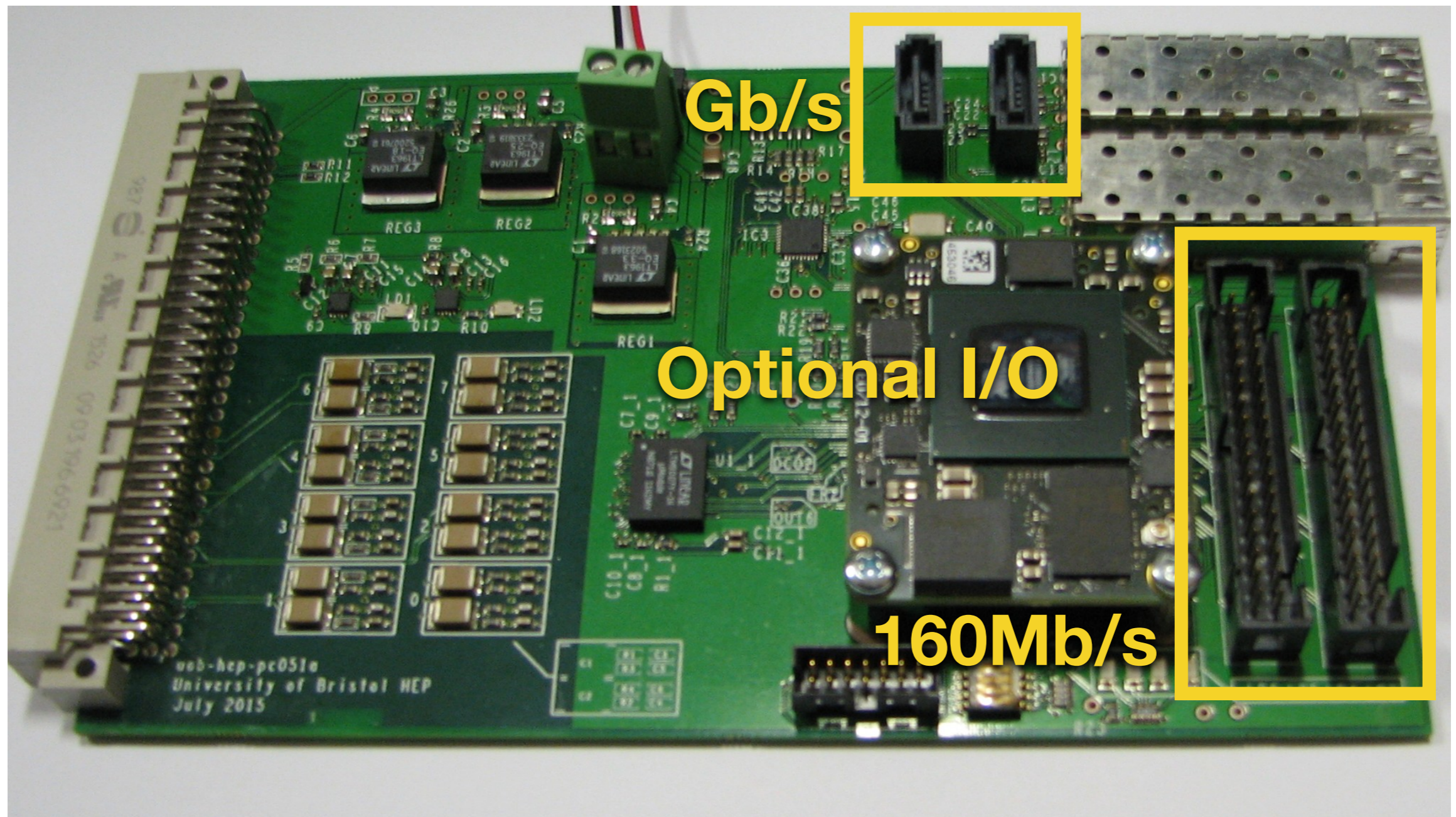
8 channel prototype

SoLiD Readout



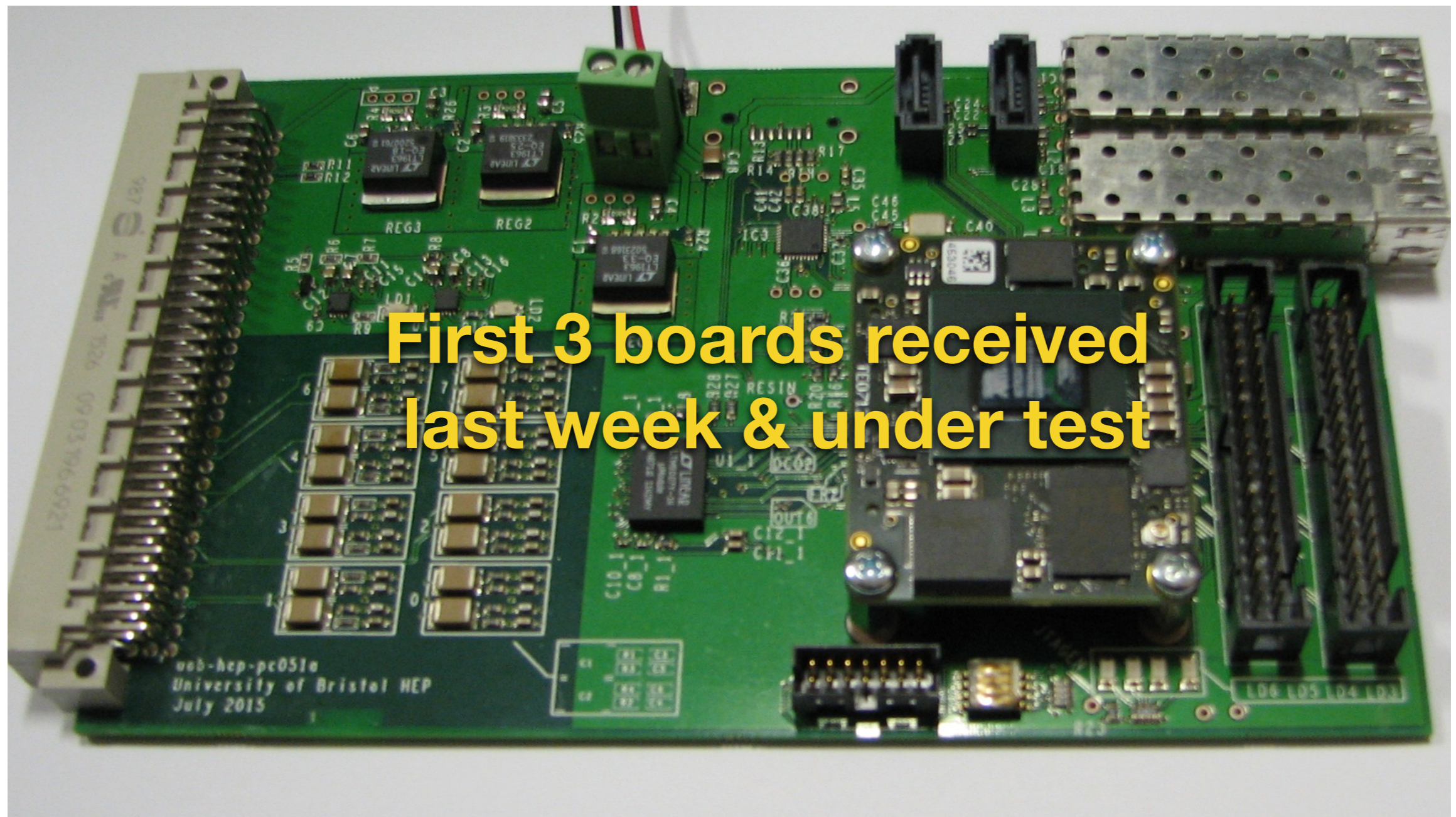
8 channel prototype

SoLiD Readout



8 channel prototype

SoLiD Readout



8 channel prototype

Firmware

- Already developed for Bristol built ad-hoc readout for SoLiD prototype
- SoLiD functionality
 - Zero suppression of data from ADC
 - Data captured in buffer on XY coincidence
 - Data read out when neutron detected
 - Buffer long enough to contain positron signal associated with neutron trigger
- Neighbouring boards communicate, allowing a region around neutron to be read out.

Possible use in milliQan

- Cost target ~ \$50/channel
- Use in MilliQan would require addition of :
 - TTC interface to receive LHC clock
 - PM tube pre-amplifiers
 - Firmware modifications - trigger, host DAQ infrastructure
- Suitable project for UK STFC Project R&D funding