素粒子実験用時間測定チップ

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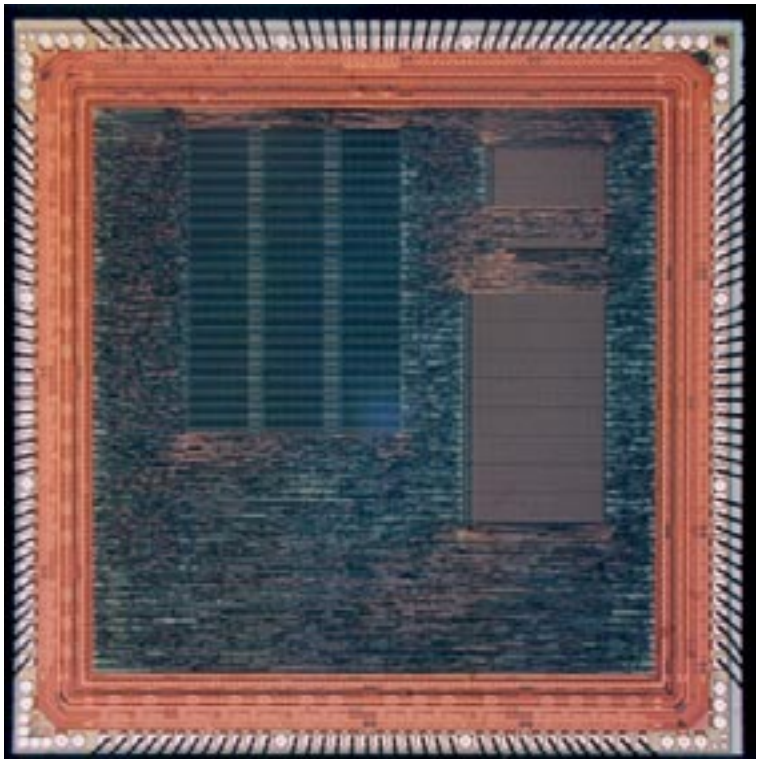
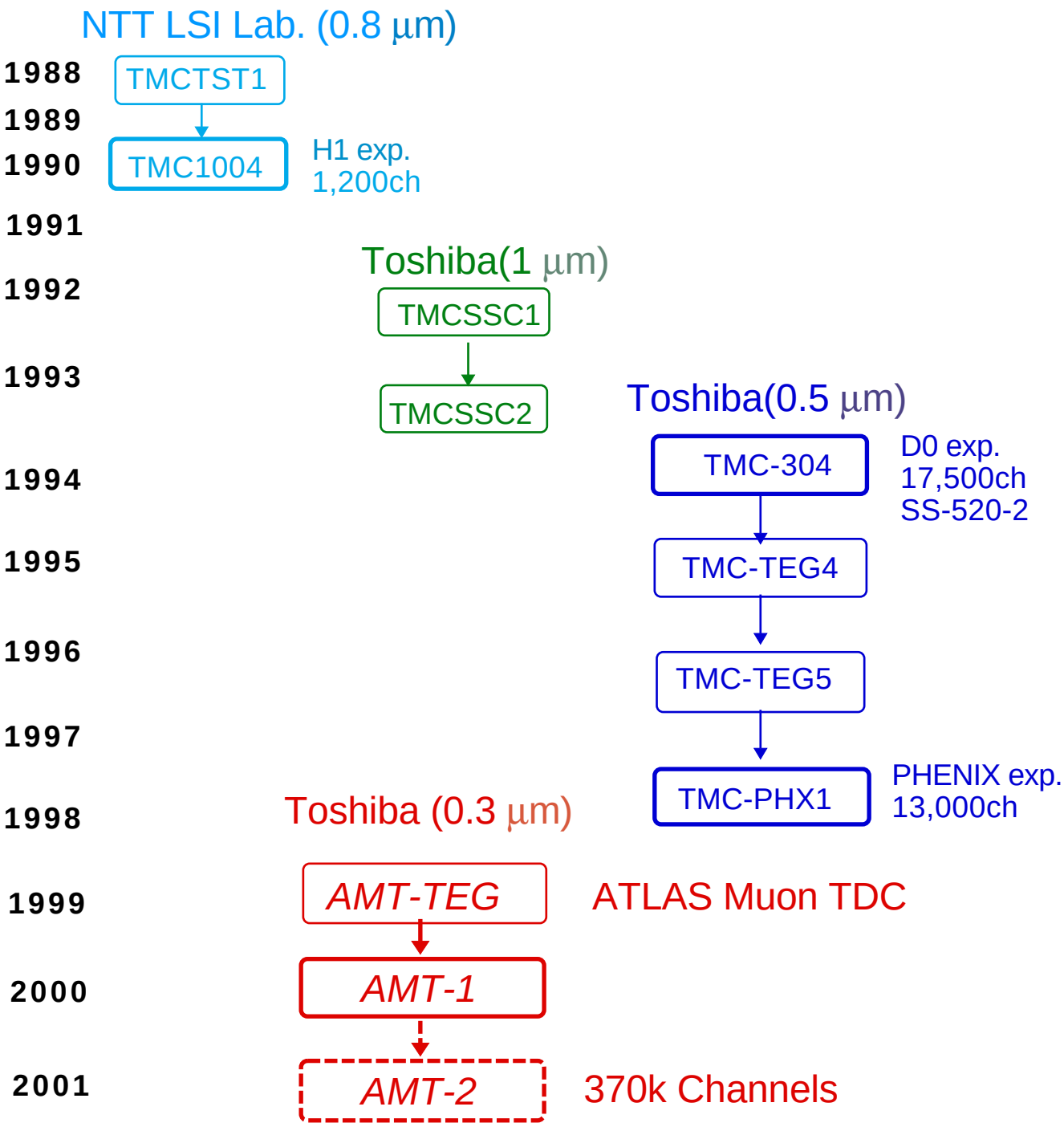
2001年5月23日
@IP Award

- 歴史
- ATLAS実験
- TDC回路の特徴
- 現状、将来





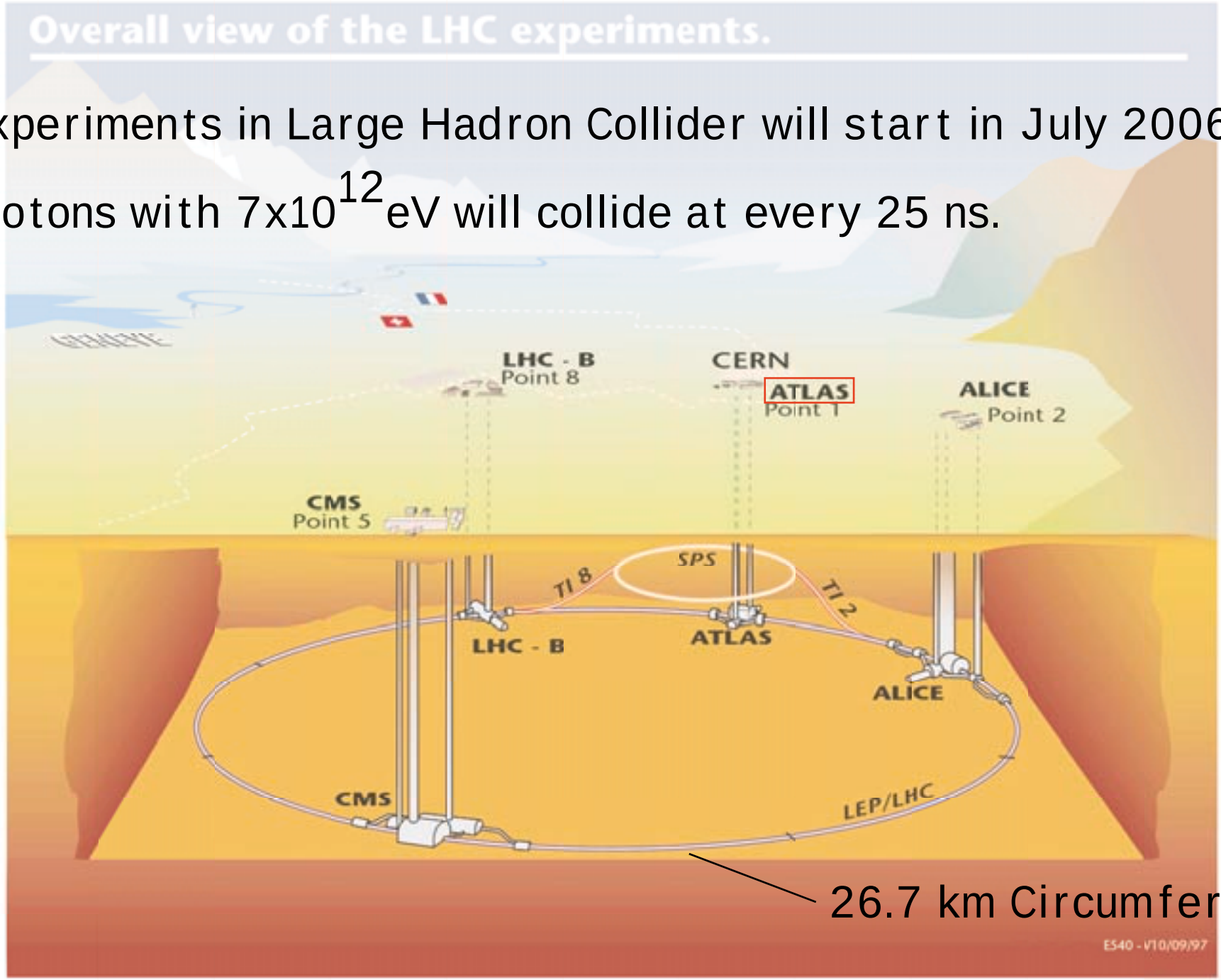
TDC Developments

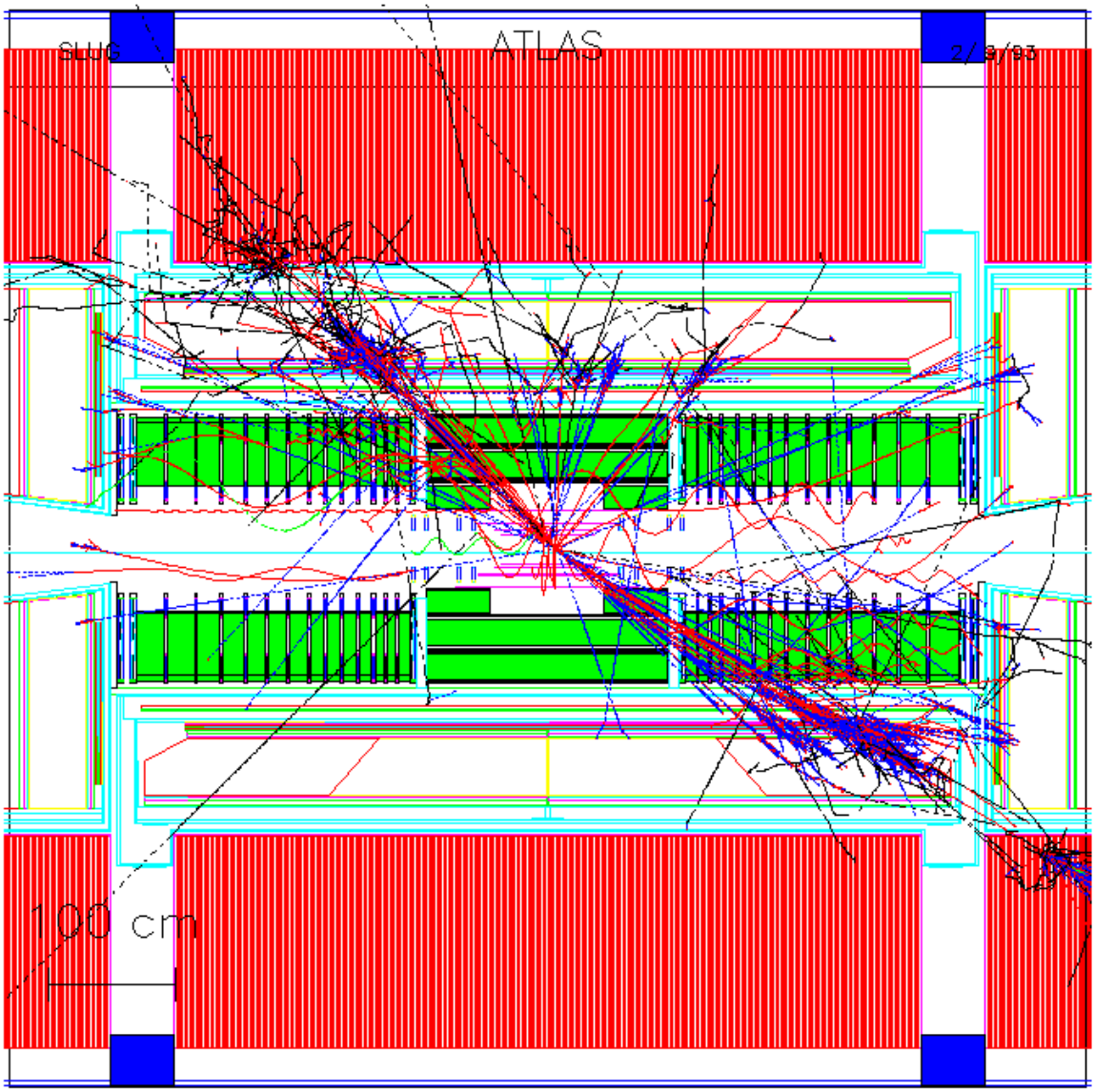
01.5 Y.A.

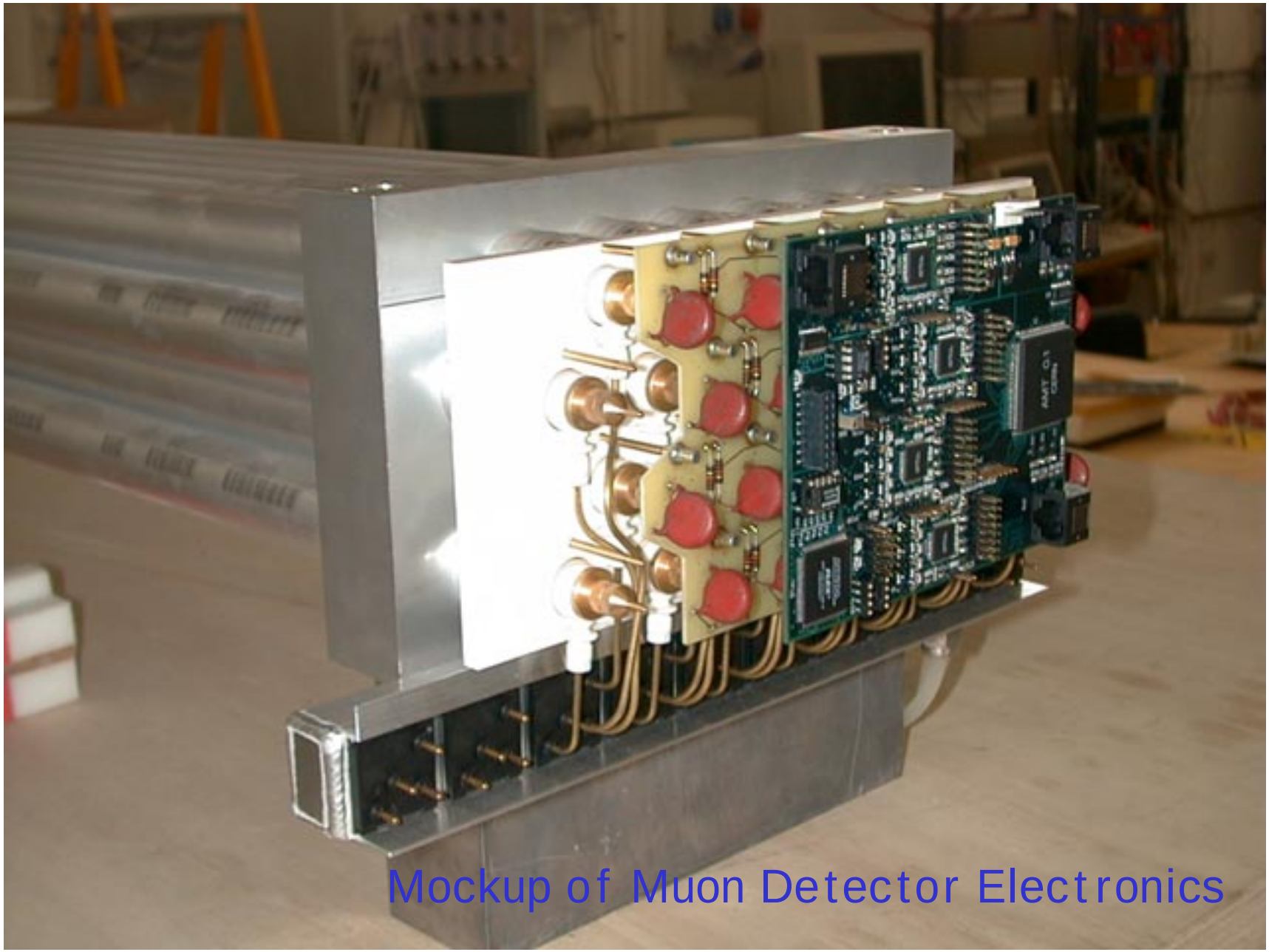

Large Hadron Collider
CERN
(Geneve)

Experiments in Large Hadron Collider will start in July 2006!

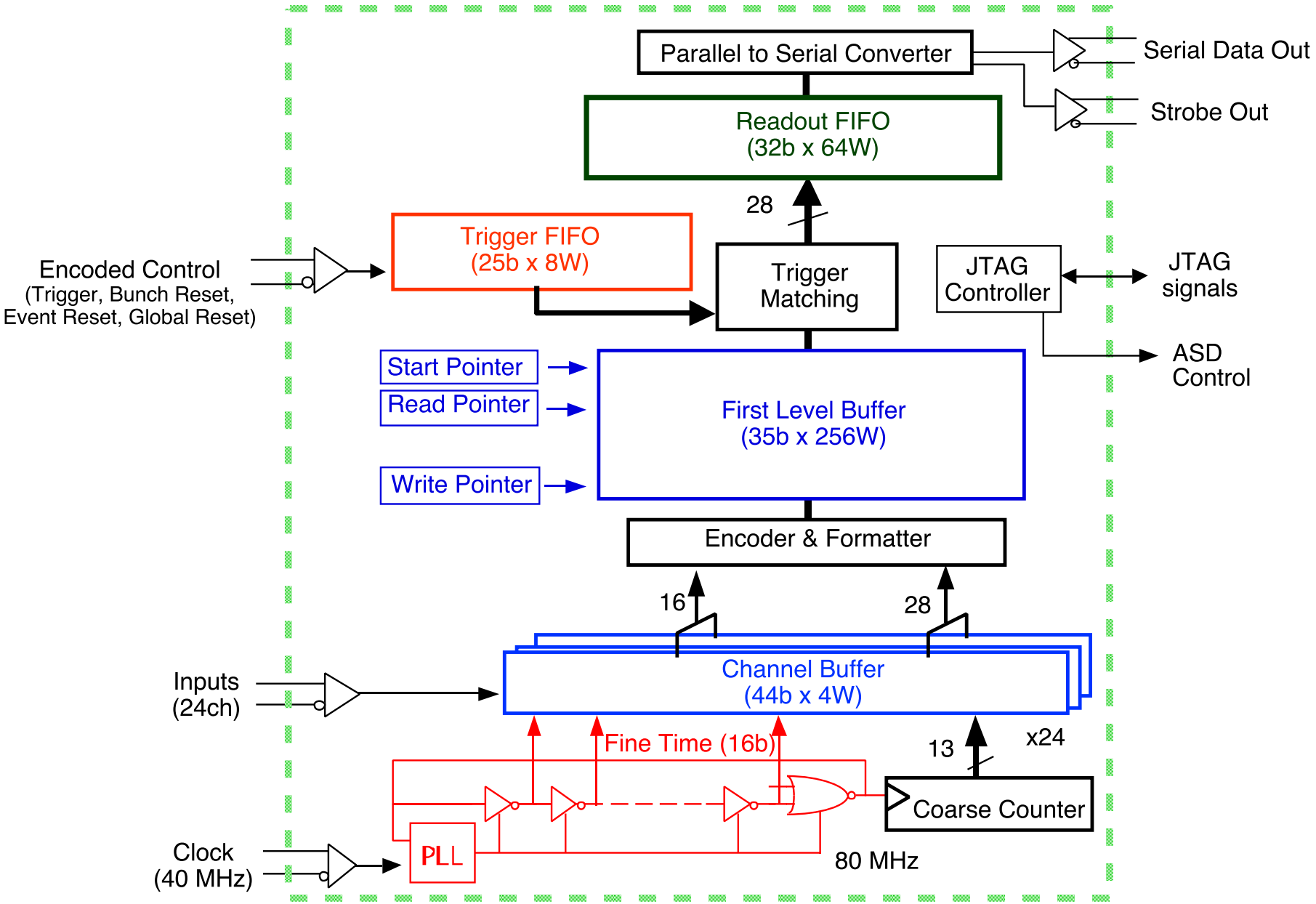
Protons with 7×10^{12} eV will collide at every 25 ns.




ATLAS
100 cm



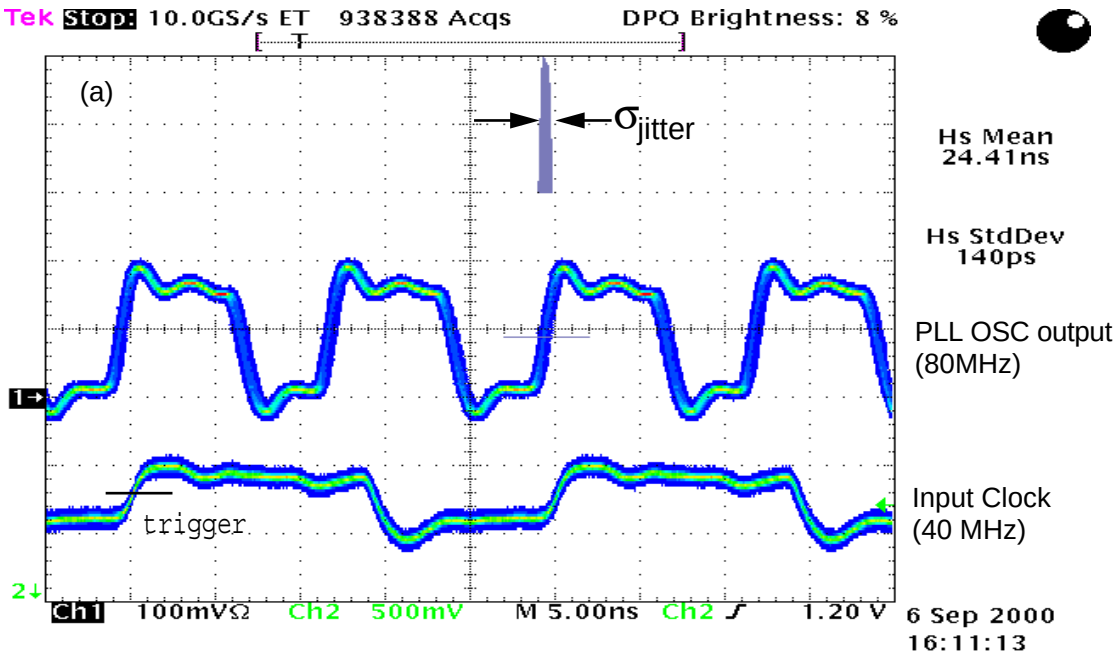
Mockup of Muon Detector Electronics

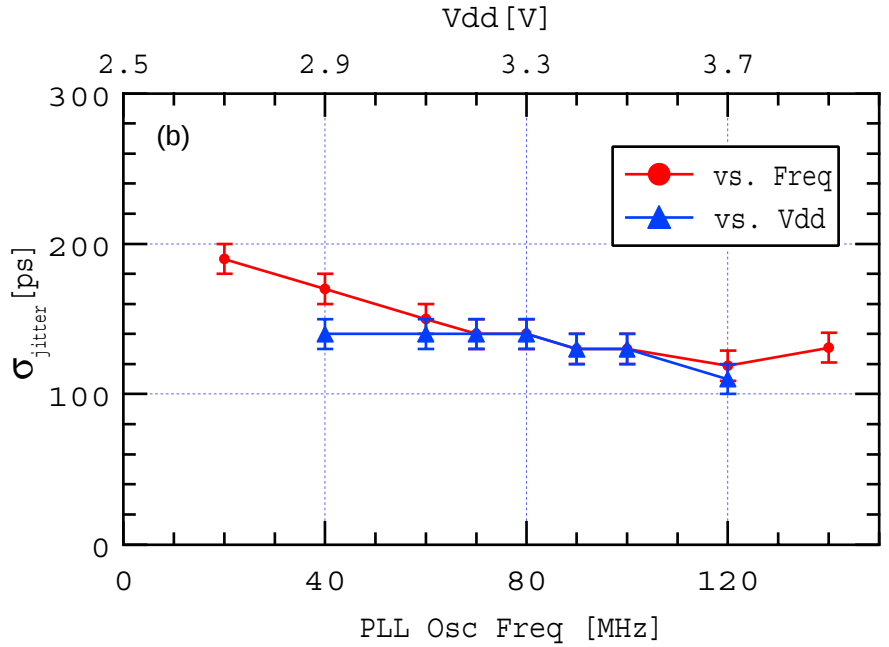


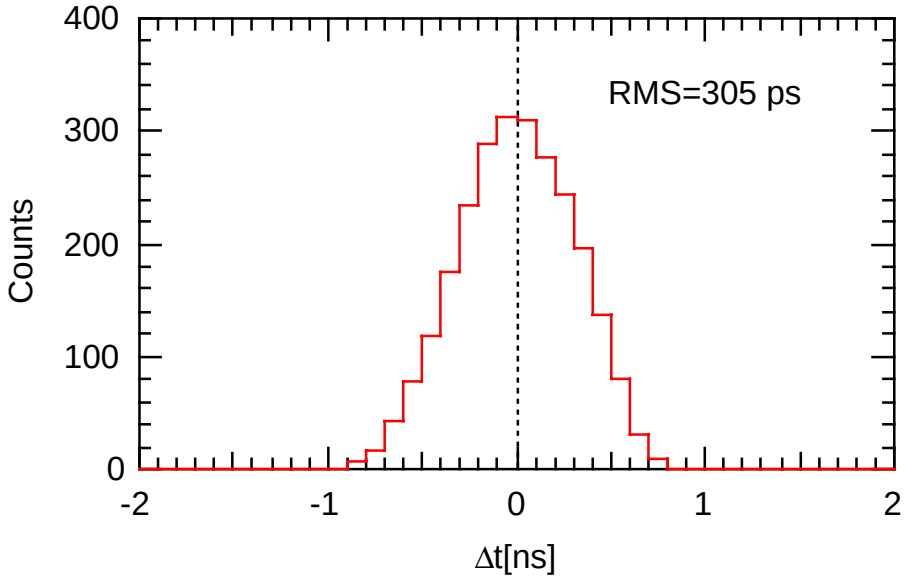
Block Diagram of the AMT

PLL Stability

σ = 140 ps

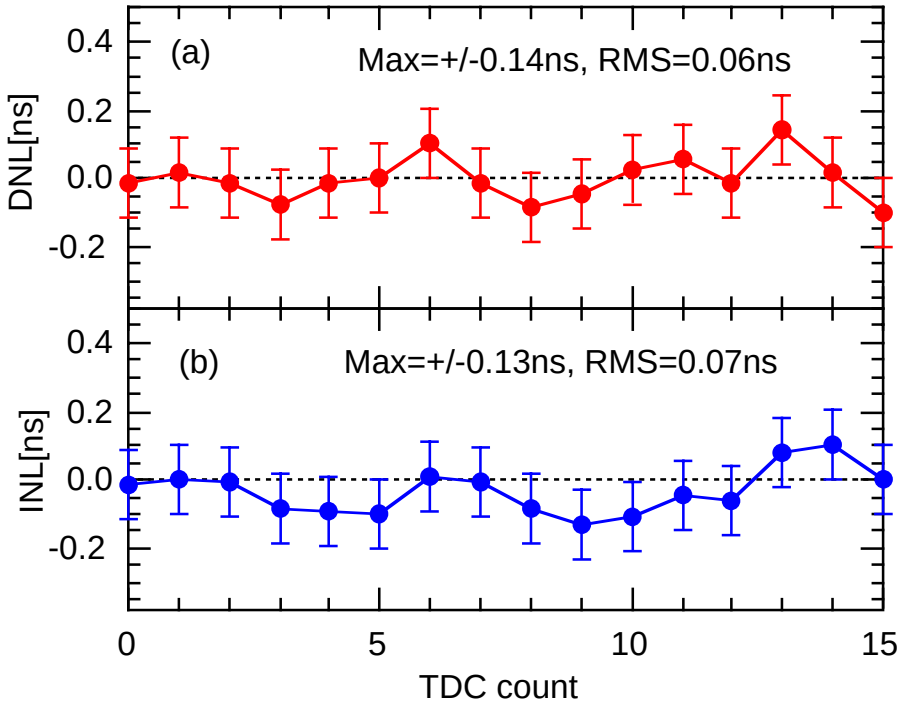




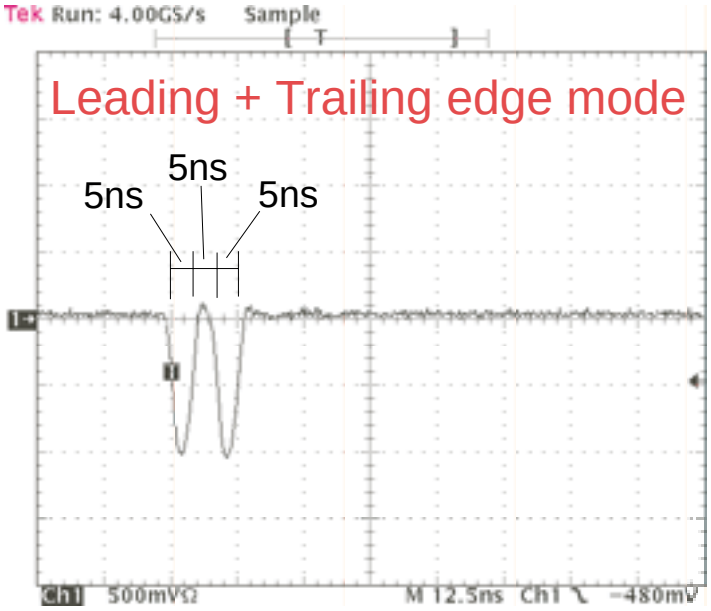


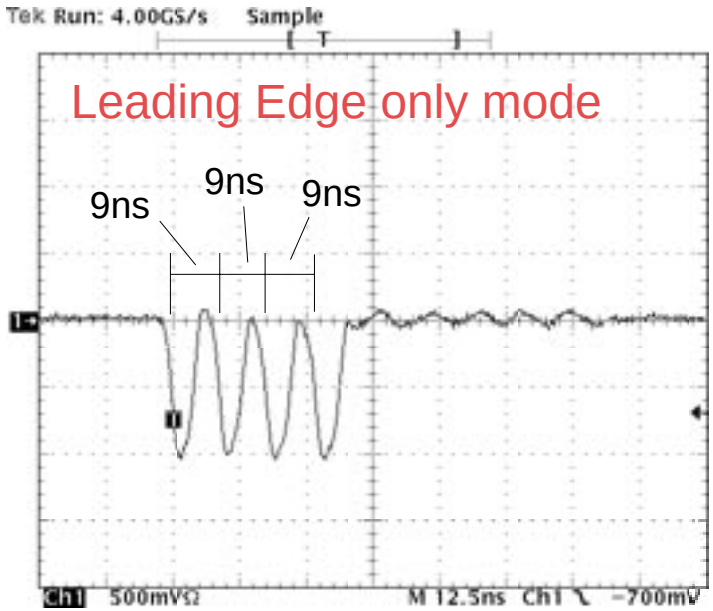
Time Resolution

Differential & Integral Non-Linearity

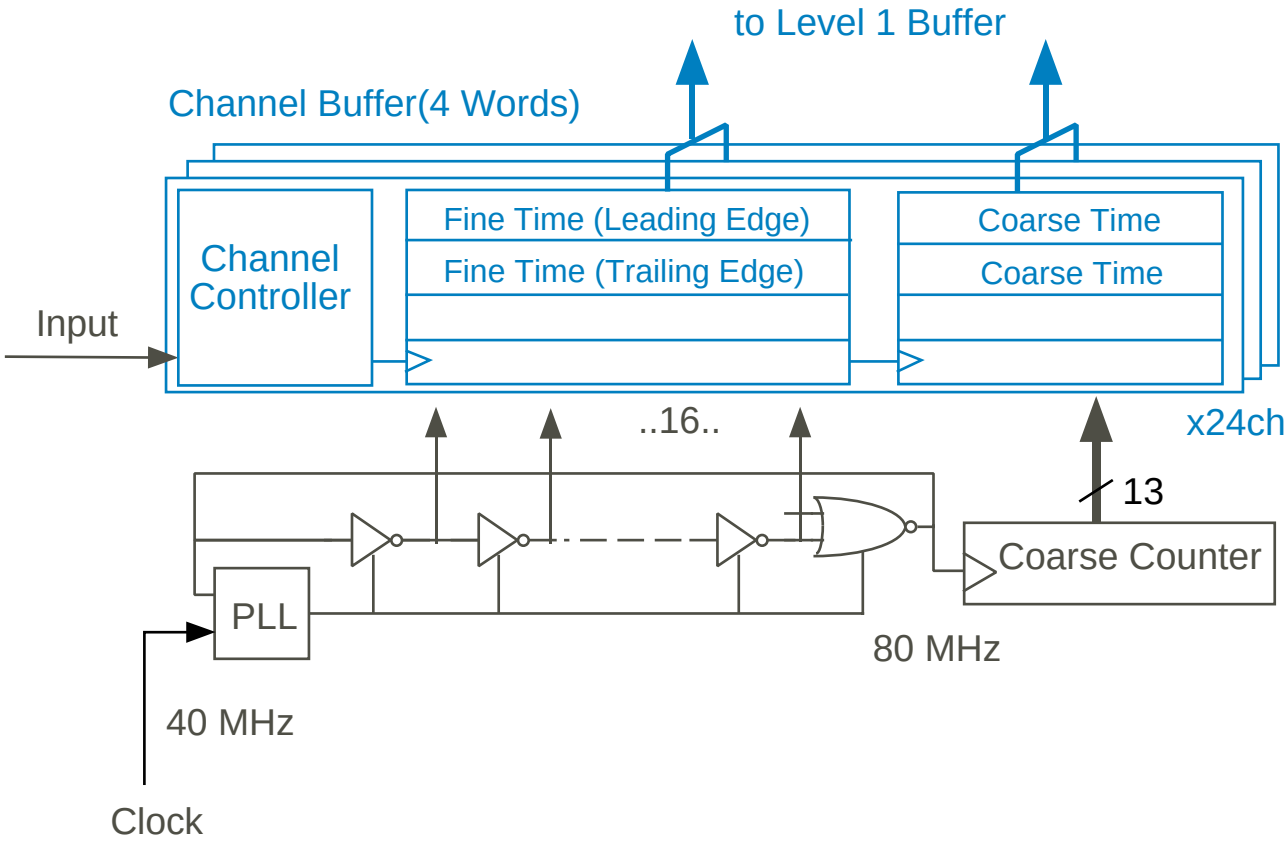


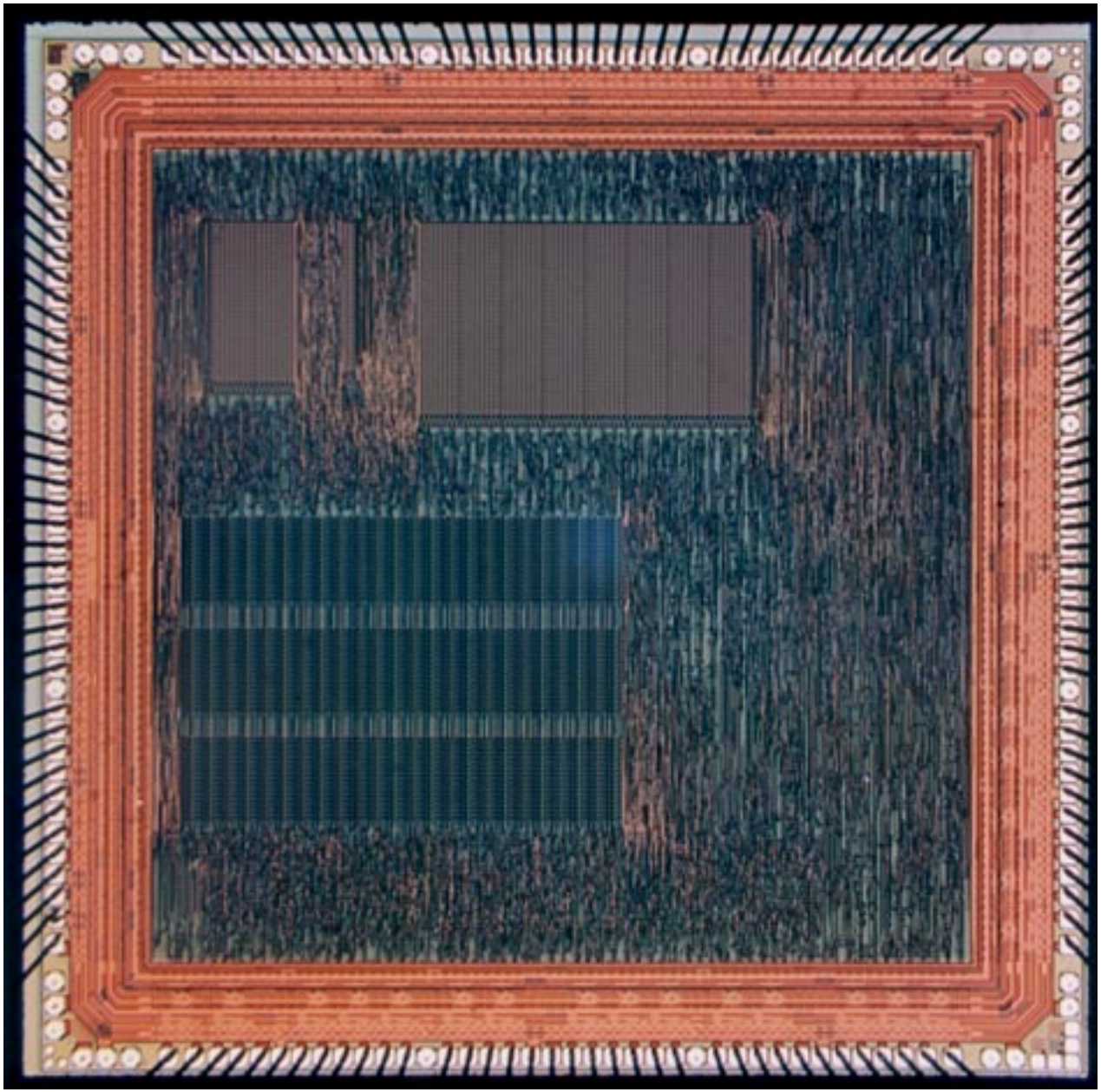
Channel Buffer Speed





Multiple Edge Resolution = 5 ns (Double Edge)
= 9 ns (Single Edge)





AMT-1 (6mm by 6mm)

AMT-1 仕様

- 300 ps timing resolution
- 400 kHz max. input rate, 100 kHz trigger rate
- Leading and Trailing edge (width) time measurement
- Trigger Latency > 3 μs
- Low-cost, Low-power (~10 mW) & High-density (24 ch/chip)
- LVDS interfaces
- 40 Mbps Serial output (10 ~80 Mbps)
- Radiation Tolerant (~11 krad, 1.2×10^{13} n/cm^2 @10year LHC)
- JTAG I/F, BIST, Serial control
- 0.3 μm CMOS Gate Array (110 k gates used)
- 144 pins plastic QFP

2002年量産(~2万個)予定
2006年実験開始!