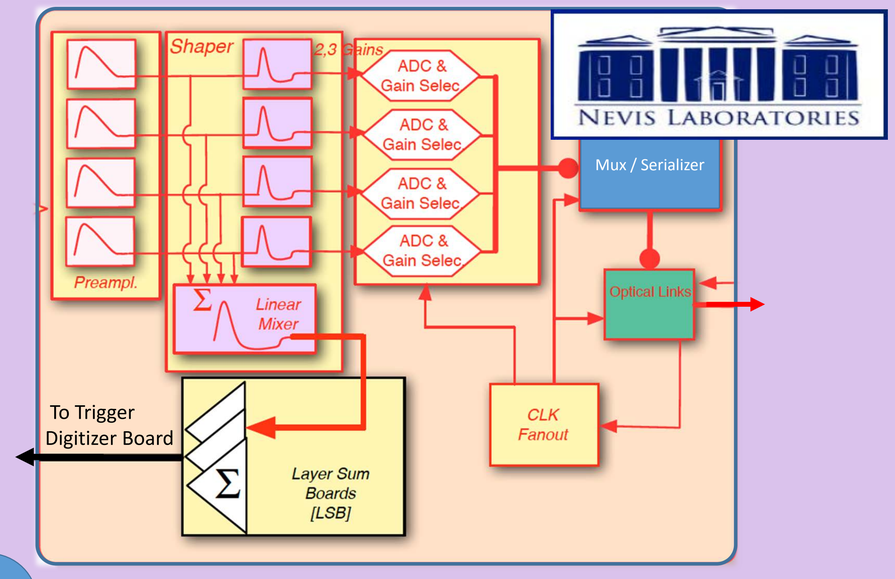
ATLAS LAr Phase II upgrade of the Front End Electronics

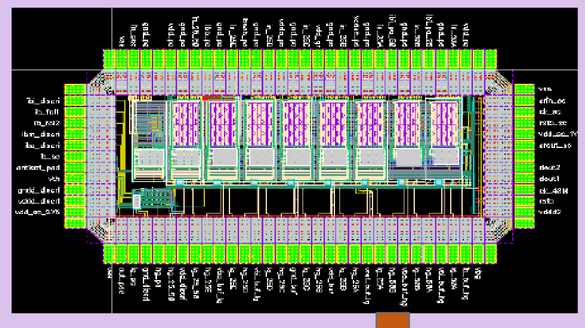
The Phase II upgrade of the ATLAS Liquid Argon detector includes a 17 bit dynamic range front end amplifier with a two or three gain multi-pole shaper employing CR-(RC)^n shaping. Each gain stage of the shaper will be followed by a 40Msps, 14b dynamic range, 12-13b ENOB digitizer, serializer and fiber optic driver. A study is underway to see if a single technology (65nm or 130nm CMOS) will be suitable for all blocks up to the optical Link, enabling consideration of the development a Front End System On a Chip (FESOC).

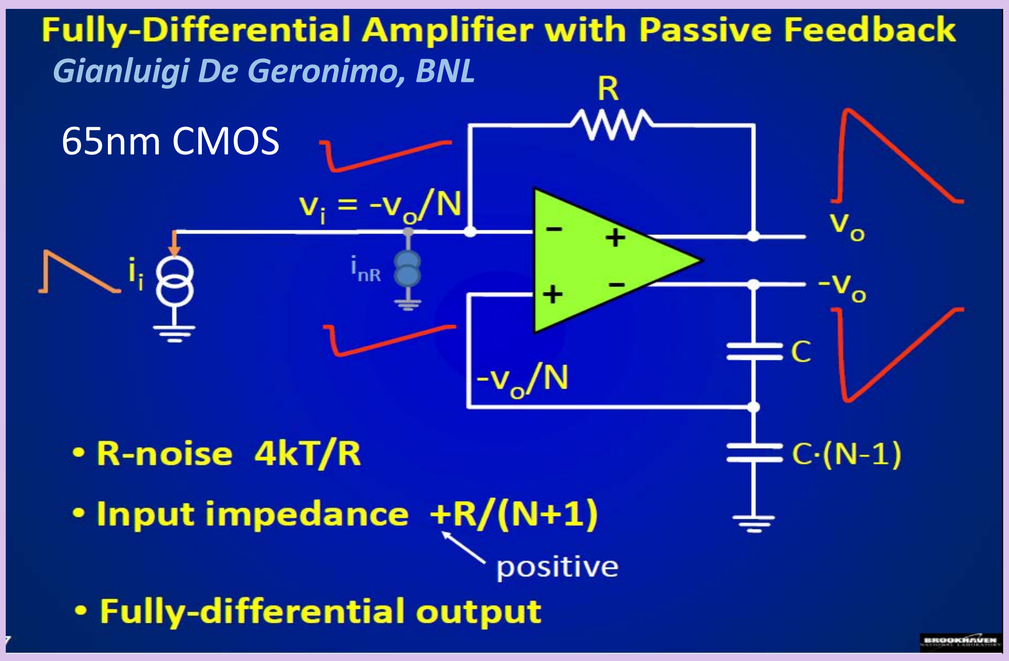
LAr Front End Card Blocks

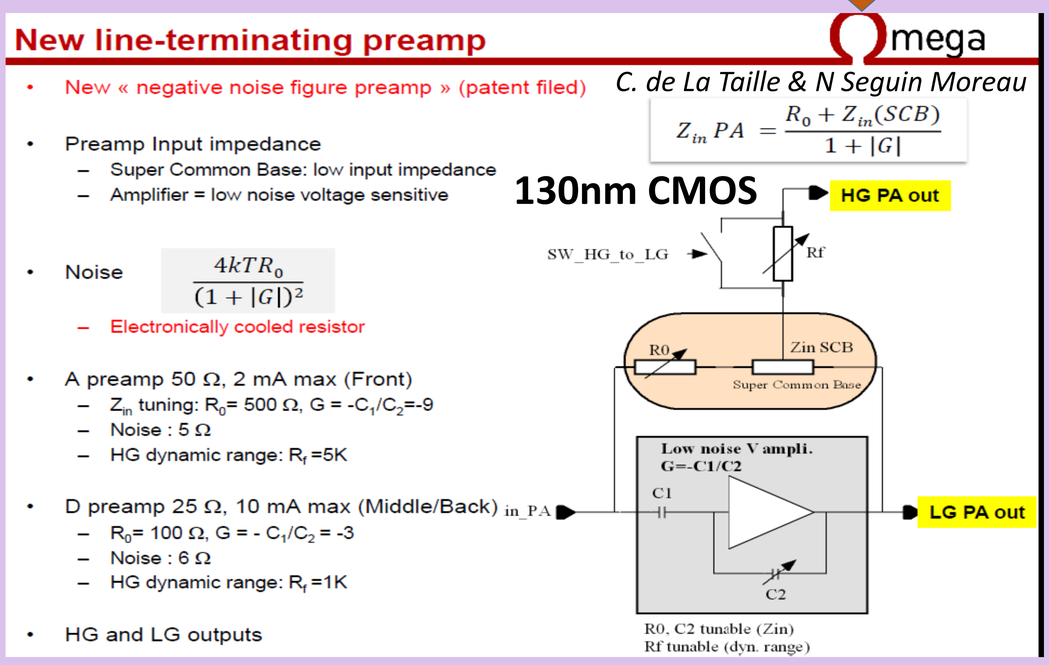


Preamp Requirements: Input termination selectable 25Ω or 50Ω
Maximum Signal Current 10mA (25Ω term)
LAr pad / strip capacitance 0.16 to 2nF
Linear Dynamic Range 17 bits.

Two Preamp Designs under Investigation

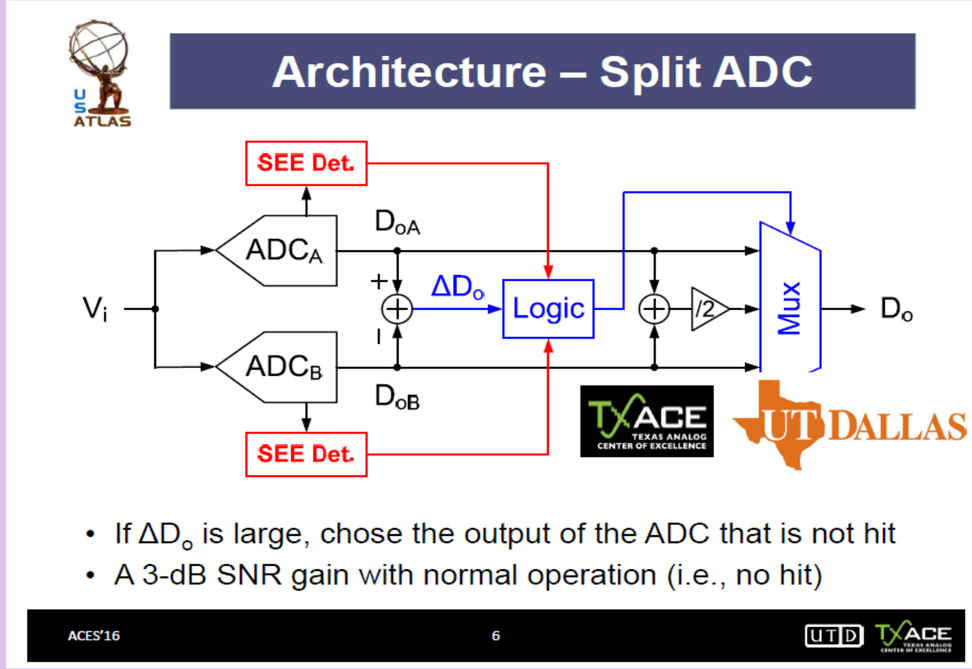


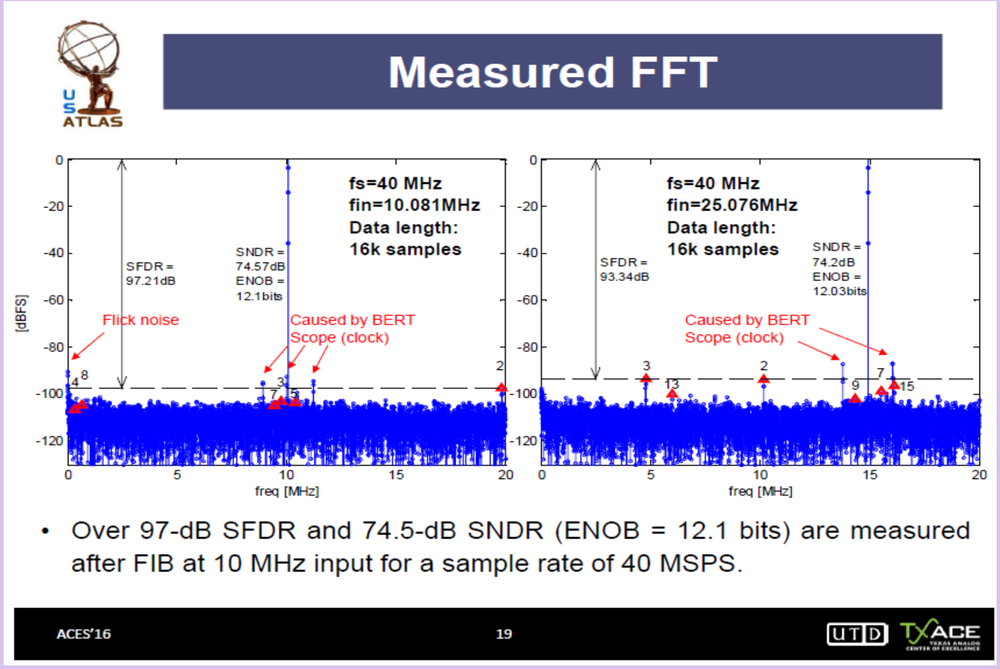




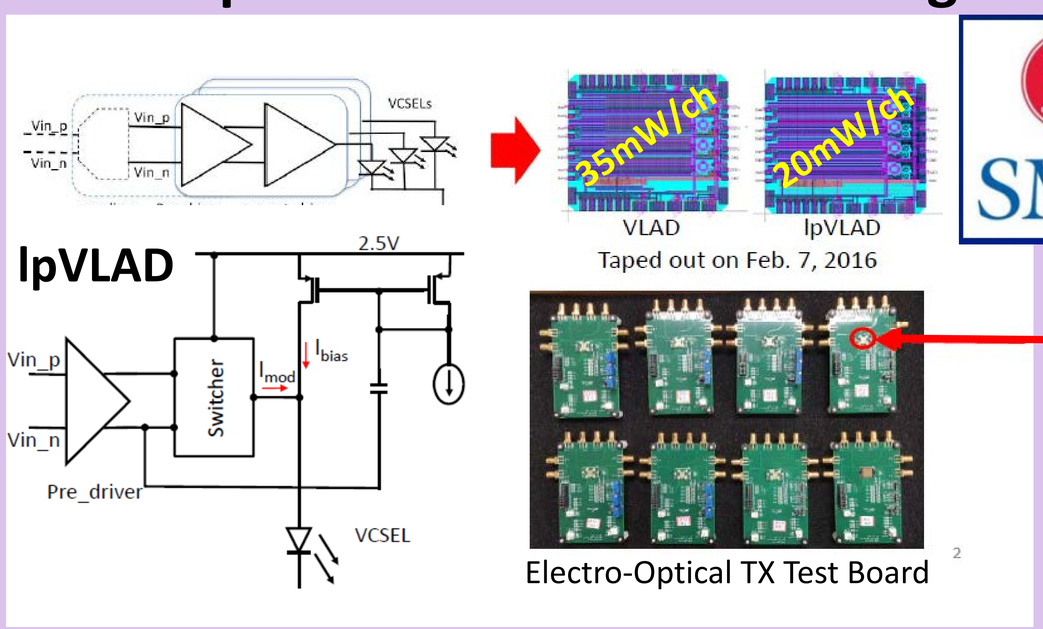
14-bit Split-SAR ADC prototype UT Dallas[1]/ SMU[2]

Hongda Xu[1], Yongda Cai[1], Ling Du[1], Datao Gong[2], and Yun Chiu[1]



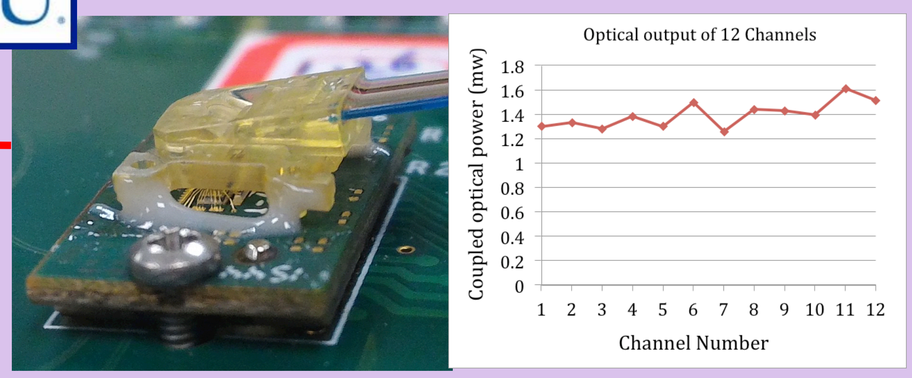


10Gbps 4 ch Fiber Driver 2 Designs



Atx 12 ch. Array Optical Transmitter

12 ch. Tx *prototype* with (right angle) Prizm "Light Turn" Connector tested at 8GHz



10X15mm footprint 5.3mm Height