

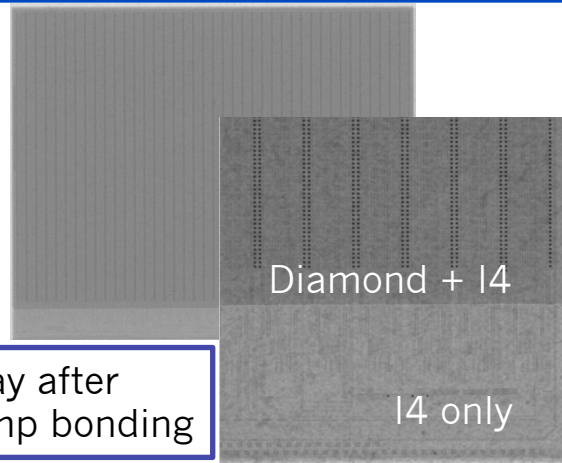
Module on test board

- (1) Polishing done at OSU
- (2) Acid cleaning done at OSU
- (3) O₂-plasma cleaning
- (4) Embedding in ceramic wafer
- (5) Ar re-sputtering on bias side: TiW 230nm + Au 200nm
- (6) Ar re-sputtering on pixel side: TiW 200nm + Cu 300nm
- (7) Lithography of pixel structure
- (8) Wet etch TiW between pixel
- (9) Cutting out of wafer and cleaning
- (10) Annealing 450°C for 4 min
- (11) Flip-chip to pixel readout chip

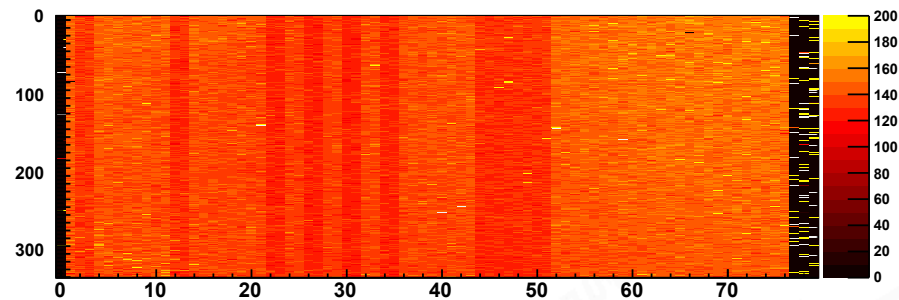
→ Process developed with Fraunhofer IZM (Berlin) a method for building diamond pixel modules over the last decade with ATLAS pixel electronic

Results of diamond pixel modules

- X-ray of bump connection is perfect
- Noise $\sim 120 - 140e^-$ and distribution is uniform over the chip
- Modules see reasonable ToT distribution with ^{90}Sr source test

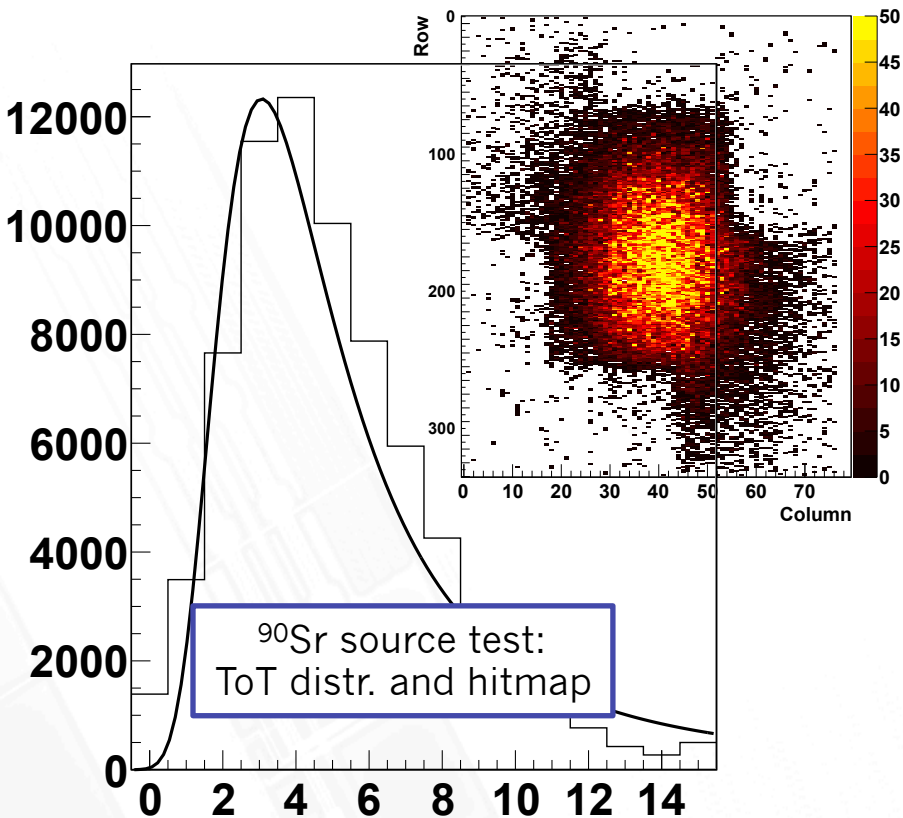
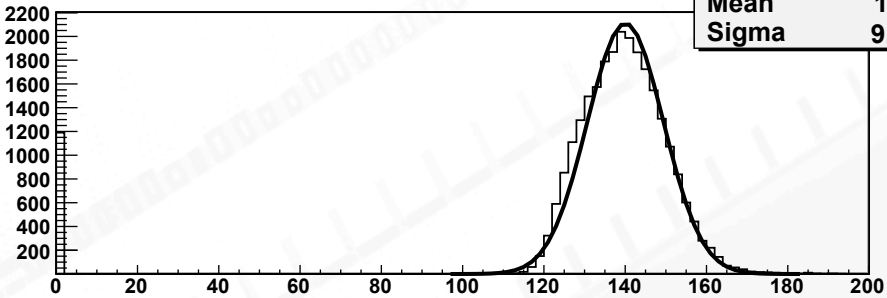


X-ray after bump bonding



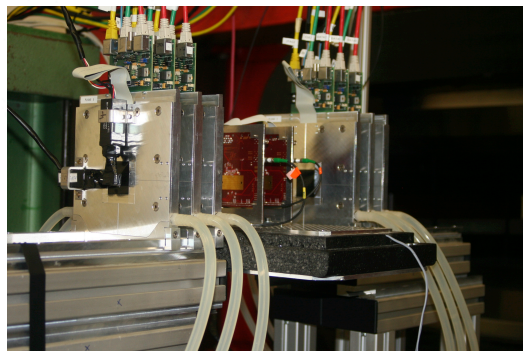
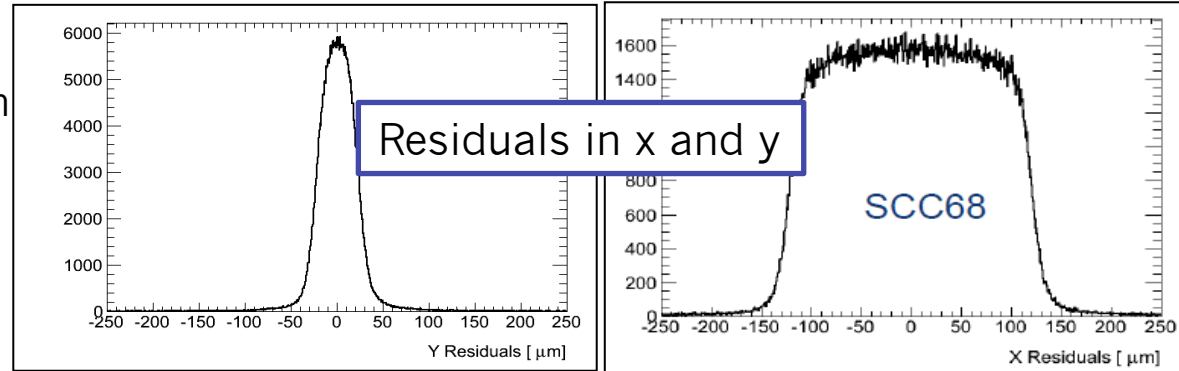
Noise distribution und map

Constant	2110
Mean	140.1
Sigma	9.372



^{90}Sr source test:
ToT distr. and hitmap

- 3 beam tests in 2011 (Cern) and 1 in 2012 (Desy)
- nearly noise free low threshold operation down to 800e⁻ threshold
- reasonable residuals for 50 x 250 μm² pixel
- nearly homogeneous in-pixel charge measurements



Beam Test setup at DESY

