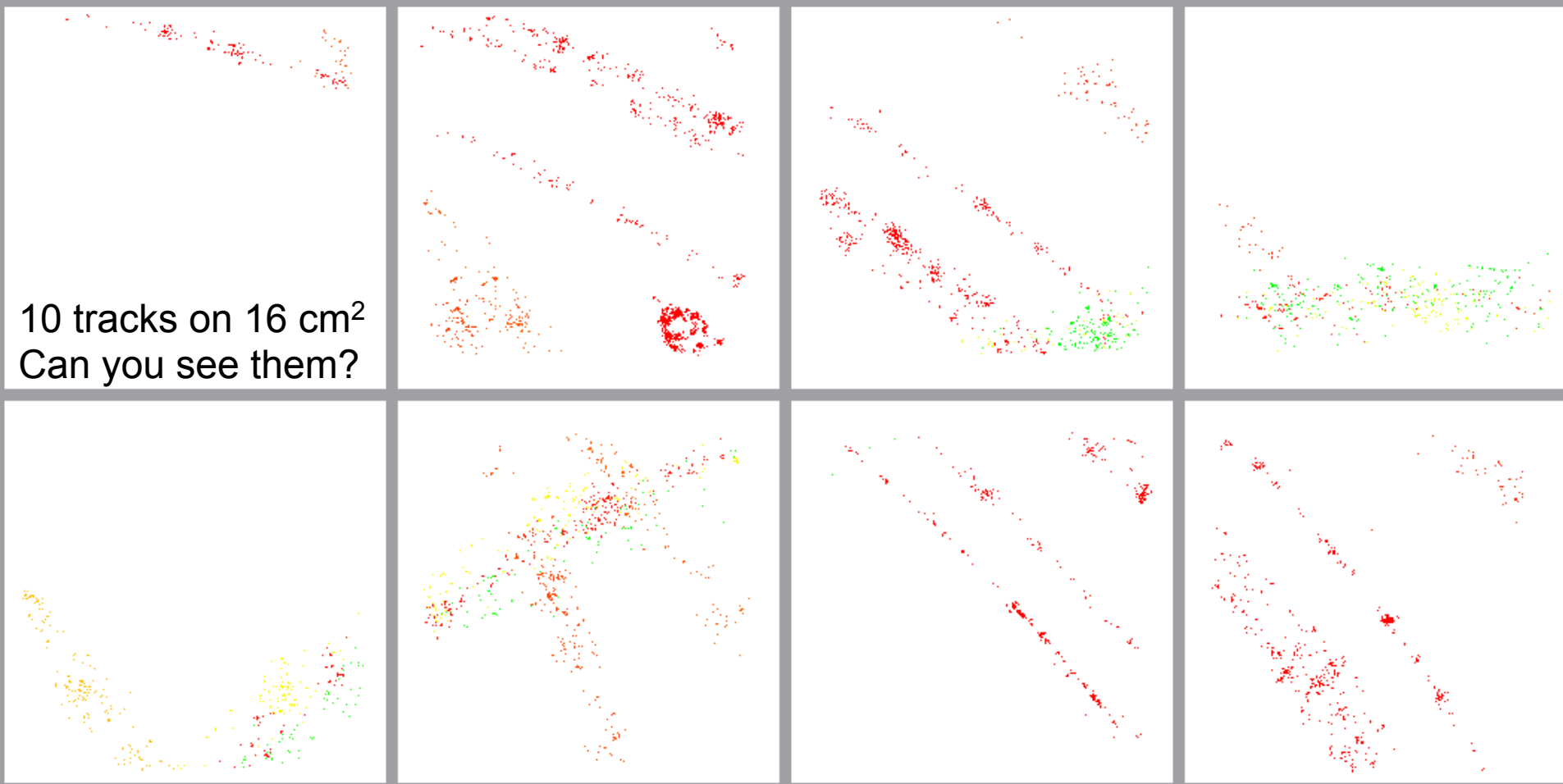
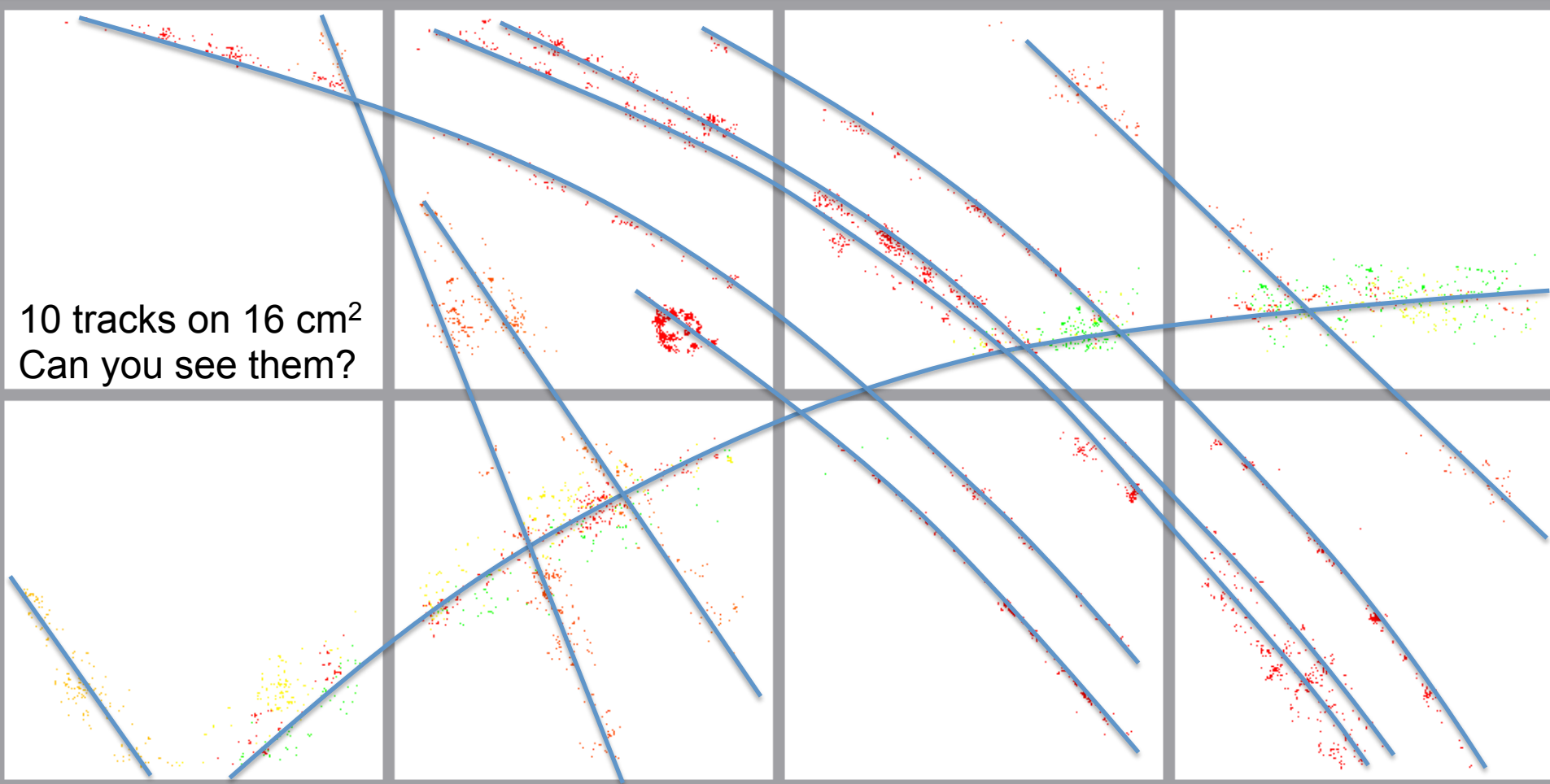


The Pixel-TPC: Status&Plans



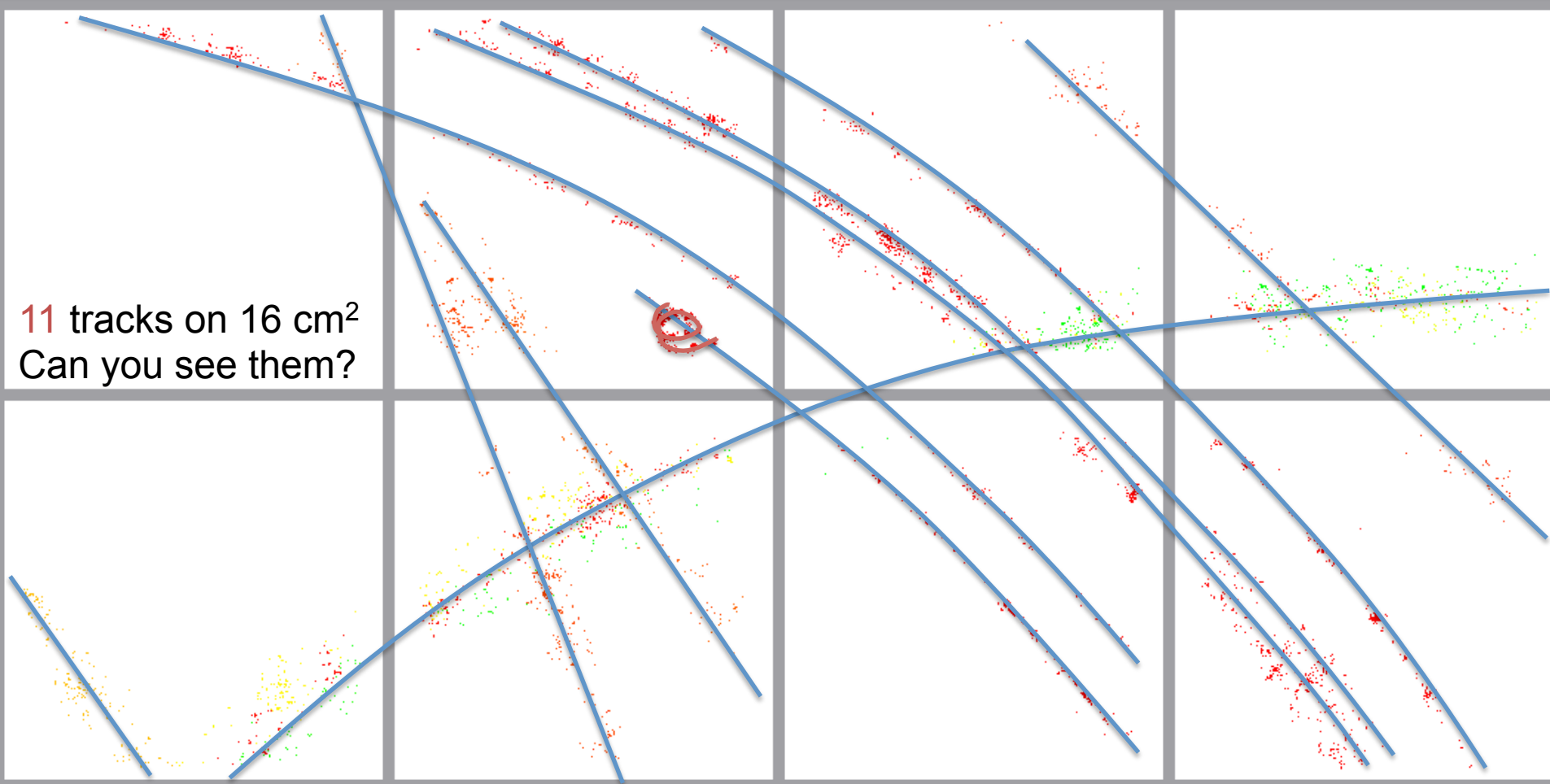
Involved Institutes: UBonn, CEA Saclay, UKyiv, NIKHEF, USiegen

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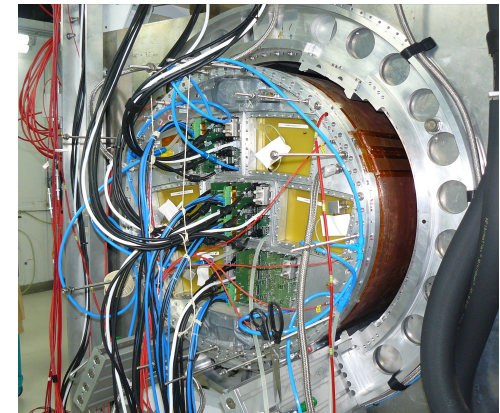
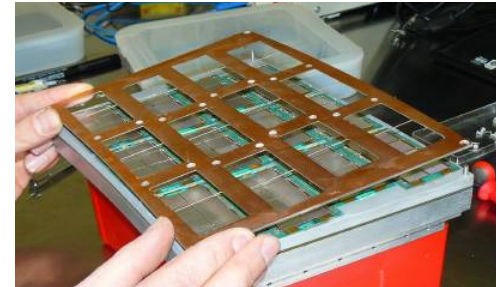
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Advantages of the Pixel-TPC

- ~100% single electron efficiency
 - maximum possible information about the primary ionization in x-y
 - z-resolution (currently) limited by sampling frequency
- identification and removal of δ -electrons
- low occupancy
- robust against gain (T,p) changes
- excellent double-track resolution
- resolution ~independent of track direction (no φ dependence)
- dE/dx through cluster counting
- factor o(100) more space points than pad-based r/o → handles for data-driven corrections

Challenges of the Pixel-TPC

- mass production of InGrids ✓
- production of full modules in finite time ✓
- area coverage (50% ✓) → xx % ?
- stability / lifetime of chips
- z resolution
- (static) field distortions at chip boundaries
- power consumption, cooling, outgassing of InGrids(?), ...



see M.Lupberger's slides

Plans

1. Analyse!!

Recent testbeam data are a goldmine. Study:

- operation (stability, parameters, ...)
- pattern recognition (so hard to beat the human eye...)
- track fitting (not obvious for tracks with $o(10^4)$ space points)
- in-situ calibration – reconstruction of (static) field map?

2. Simulate!!

Testbeam data are now excellent starting point to extrapolate to the LCTPC

- Actual performance numbers need (lots of) simulation to link detector technology with physics
- Optimization of Pixel-TPC parameters

3. Improve

Clear path to overcome the current limitations/critical issues:

- Timepix3 is available (640 MHz sampling, TOT+TOA, r/o speed ok for ILC)
- Improve InGrids (understand reasons for occasional „sudden death“)
→ all-ceramic InGrids? → improve overvoltage resistance of ASICs?

Summary

- The dream of the Pixel-TPC has come much closer!
- Clear path forward for most critical issues
- Progress limited by available person power!

KD opinion:

The Pixel-TPC is too beautiful not to remain
an option for the ILC TPC!

