

# Use of STIR for the COMPET project

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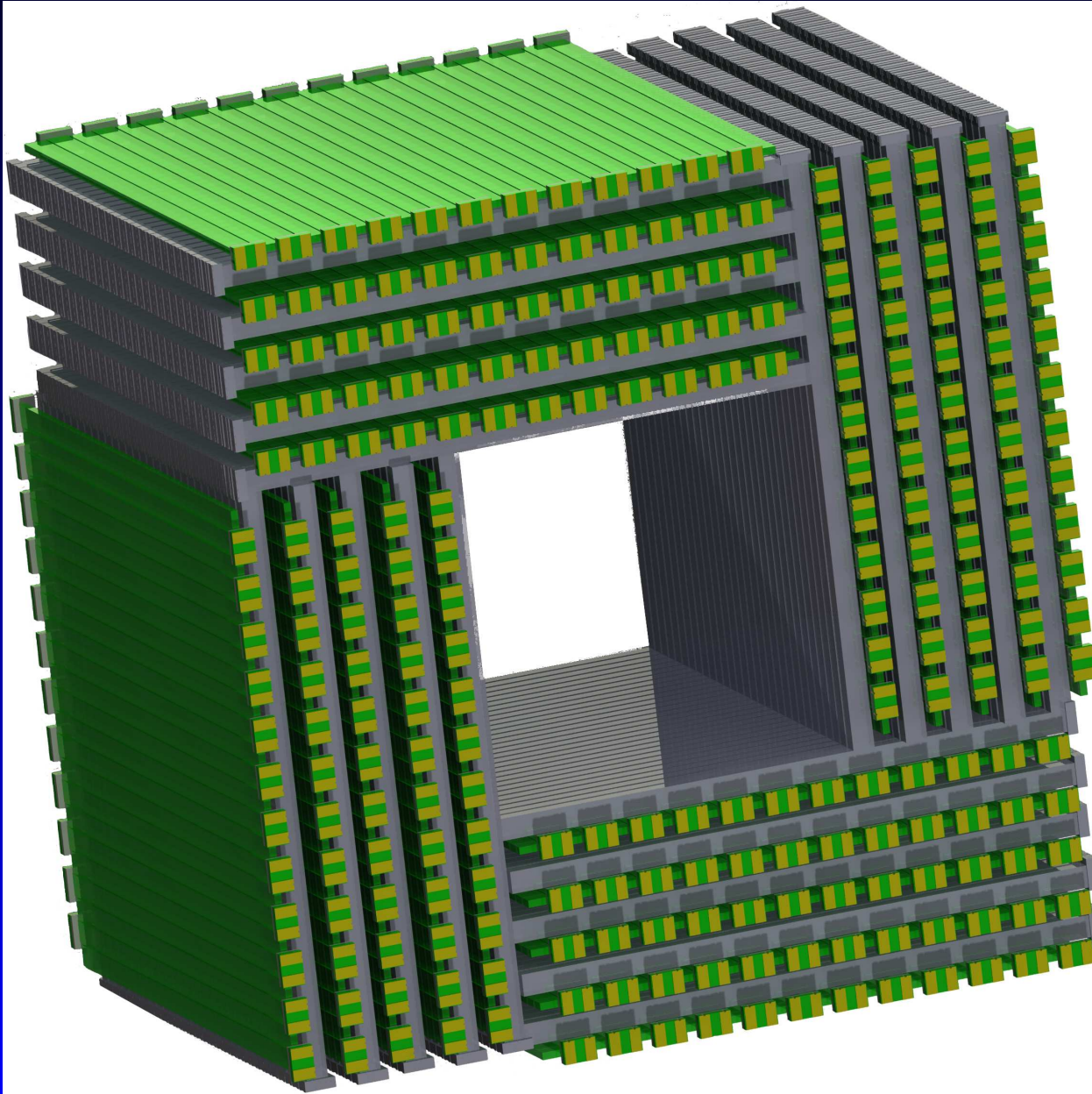
University of Oslo

# COMPET design

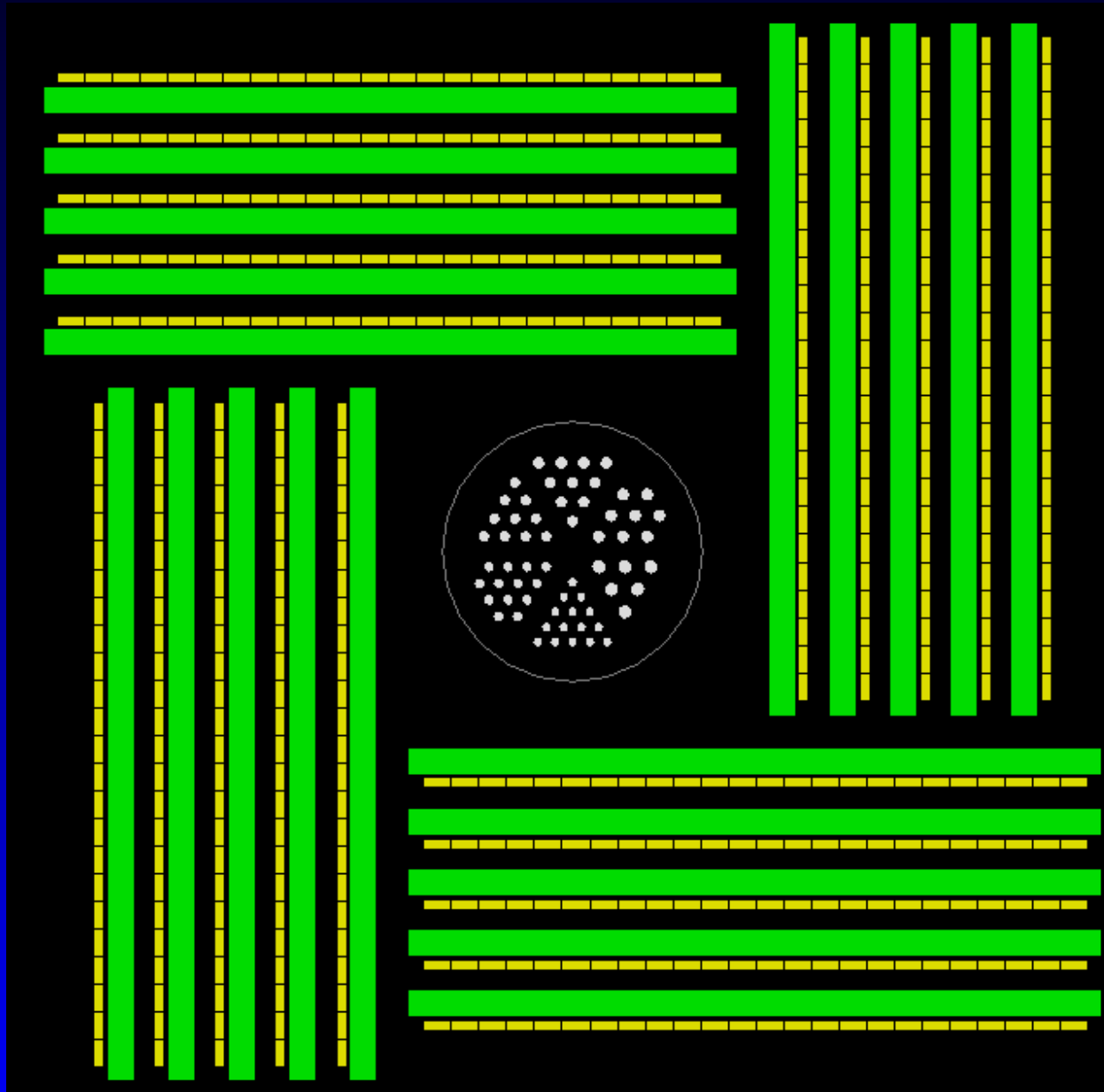
Small animal PET scanner:

- high resolution ( $\approx 1\text{mm}$  )
- high sensitivity (up to 16%)
- MRI compatible
- no inter-module or inter-crystal gaps
- novel, scalable readout
- user-friendly (easy service, etc.)

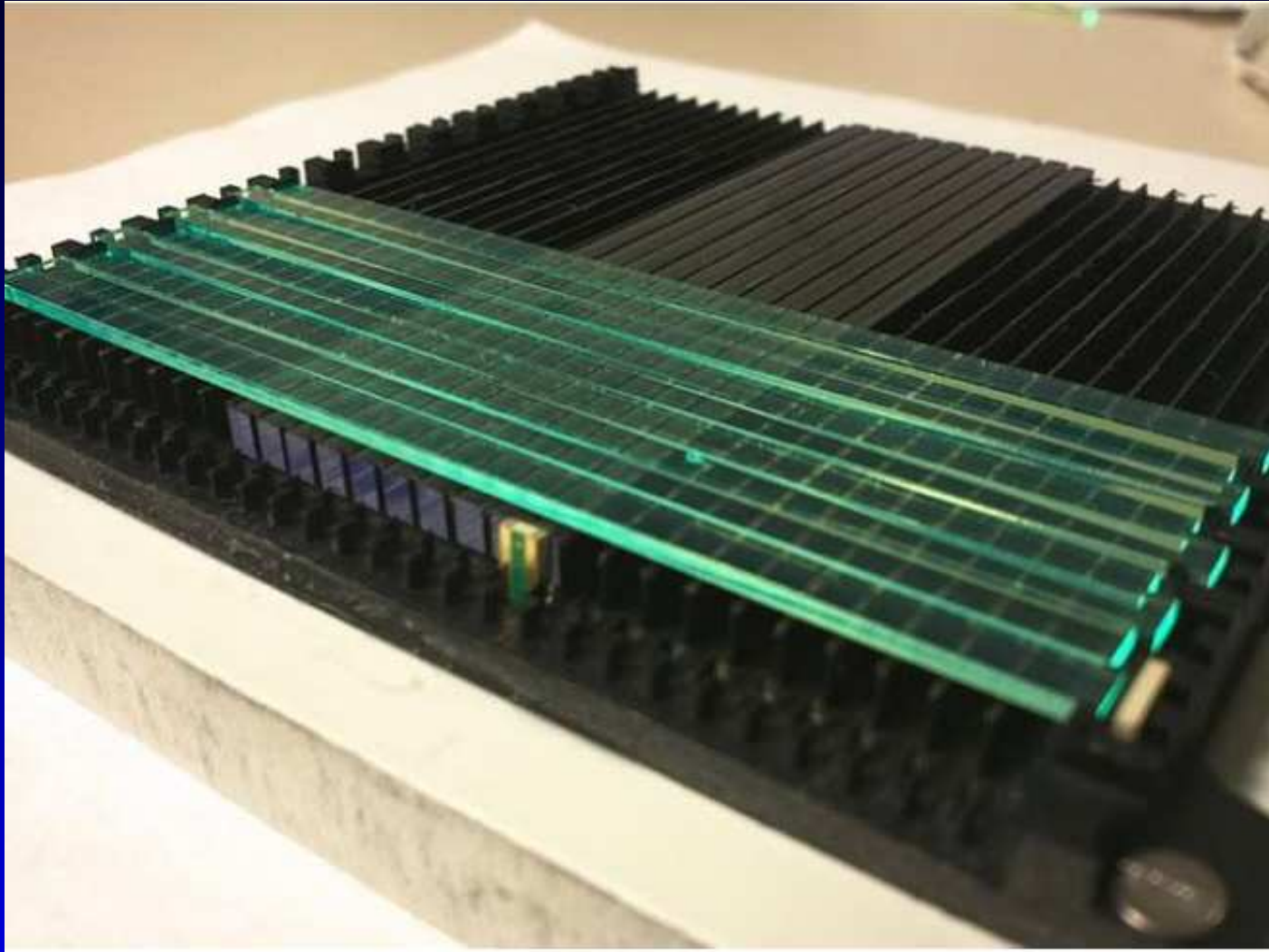
# COMPET design



# COMPET design, axial plane

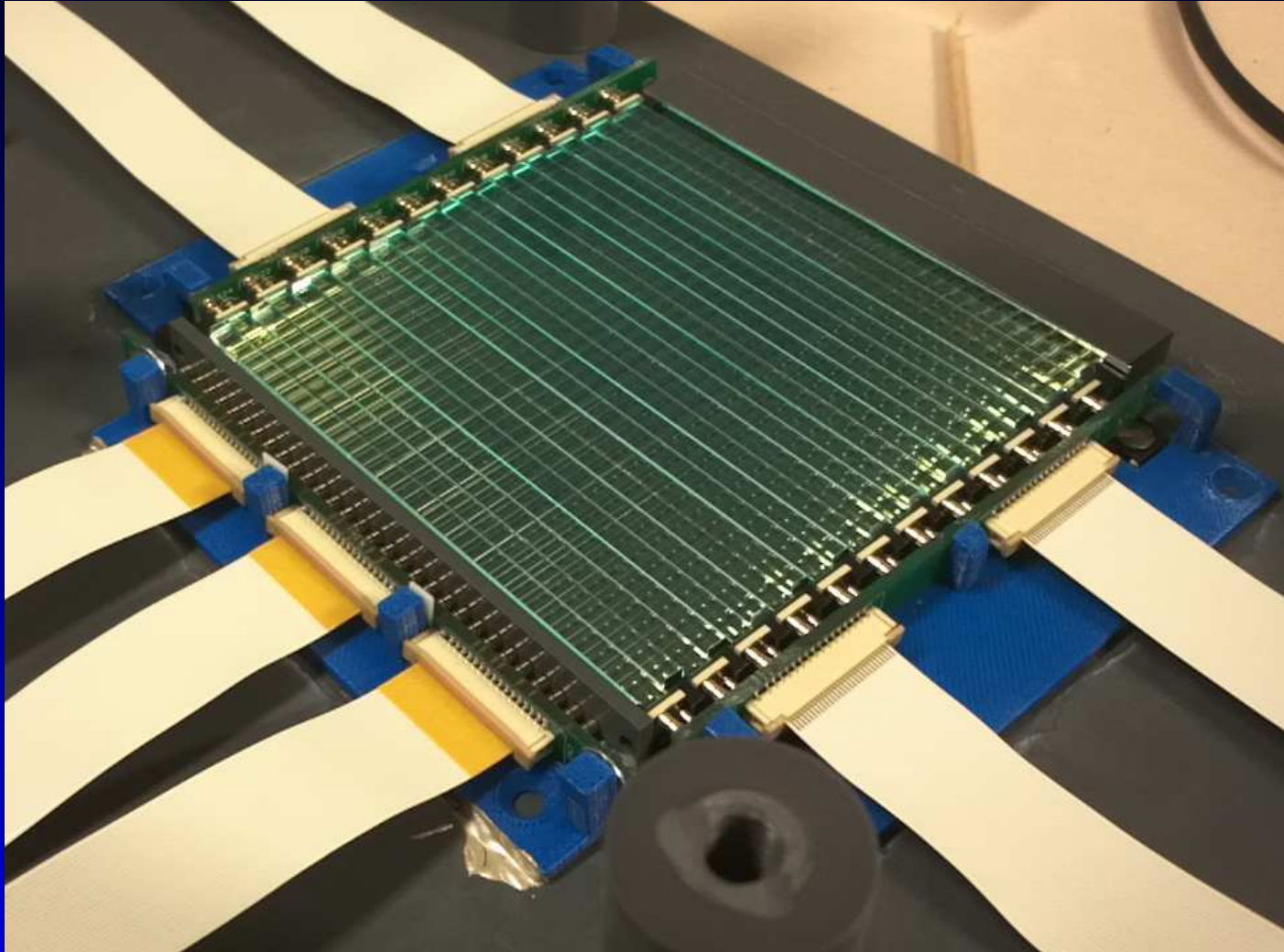


# COMPET design: layer





# COMPET design: full layer



# Design consequences

- DOI information  
(3D event coordinates)  
→ almost no parallax error
- bore opening is adjustable for the phantom  
→ sensitivity(radius), angular resolution(radius)
- discrete axial coordinates
- continuous tangential coordinates
- not easy to write a good 3D reconstruction  
→ STIR is a good solution now

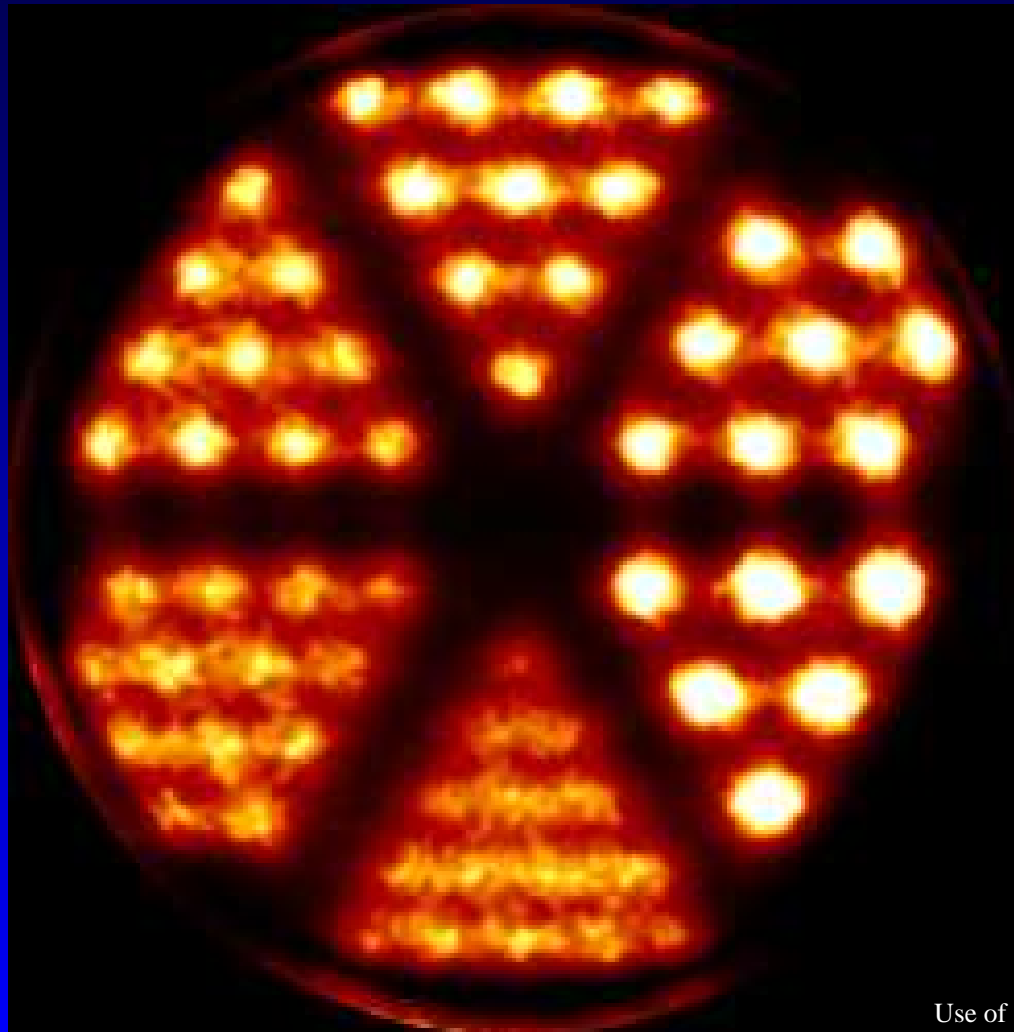
# STIR

- listmode reader (3D coordinates)
- input
  - now: GATE simulations
  - soon: measured listmode data
- sinogram based reconstructions
  - SSRB/FBP, 3DRP → NEMA tests
  - iterative methods for 'good pictures'



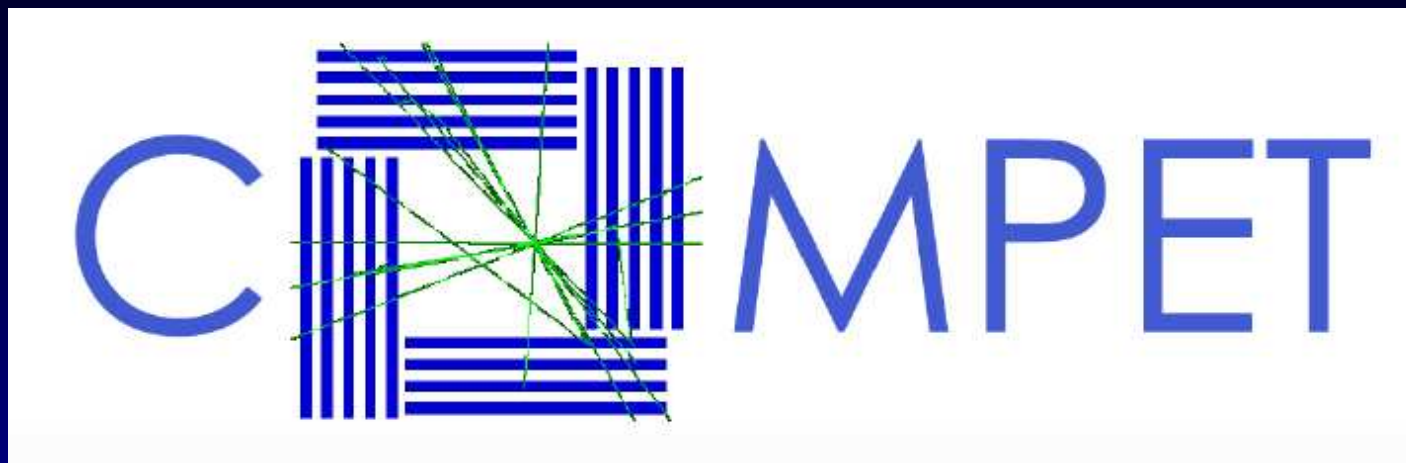
# Results

- GATE simulated *realistic* derenzo (1.0-1.5mm)
  - 13% en. res., pos. range, WLS blur, etc.



# Future plans

- parameter optimization  
(sinogram bins, iterations/subsets, etc.)
- full NEMA NU-4 2008 evaluation  
(probably with a web interface)
- STIR as reference reconstruction, comparable  
→ other devices with STIR reconstruction  
→ other reconstructions for COMPET hardware
- fast prototyping  
(STIR is flexible, easy to modify)
  - total variation (TV) regularization
  - ...
- codes and macros will be published (GPL license)



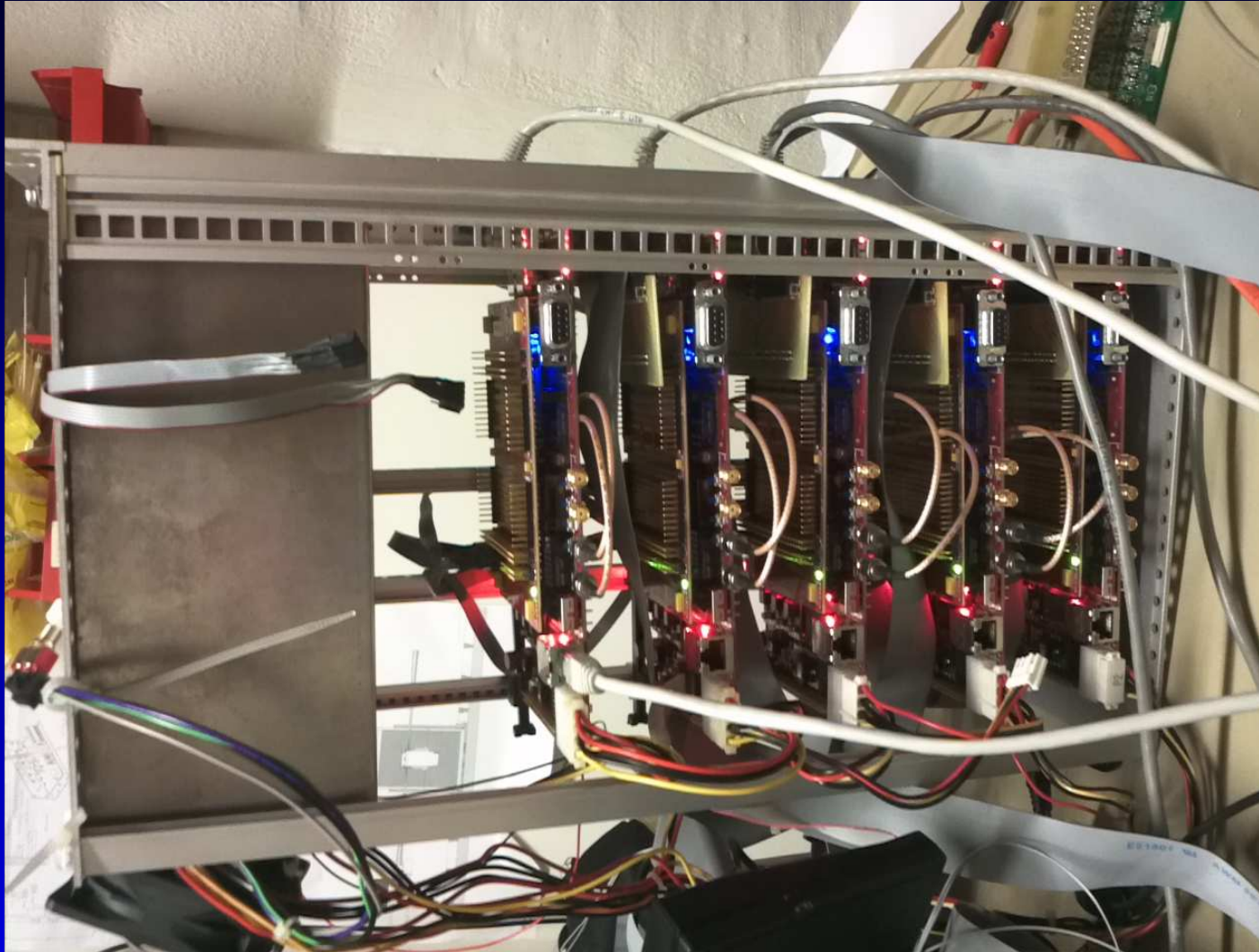
Thank you for your attention!

# Contact

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- David Volgyes, [david.volgyes@ieee.org](mailto:david.volgyes@ieee.org)
- posters: MIC18.M-32 and NP2.S-173
- <http://tinyurl.com/compet-project>

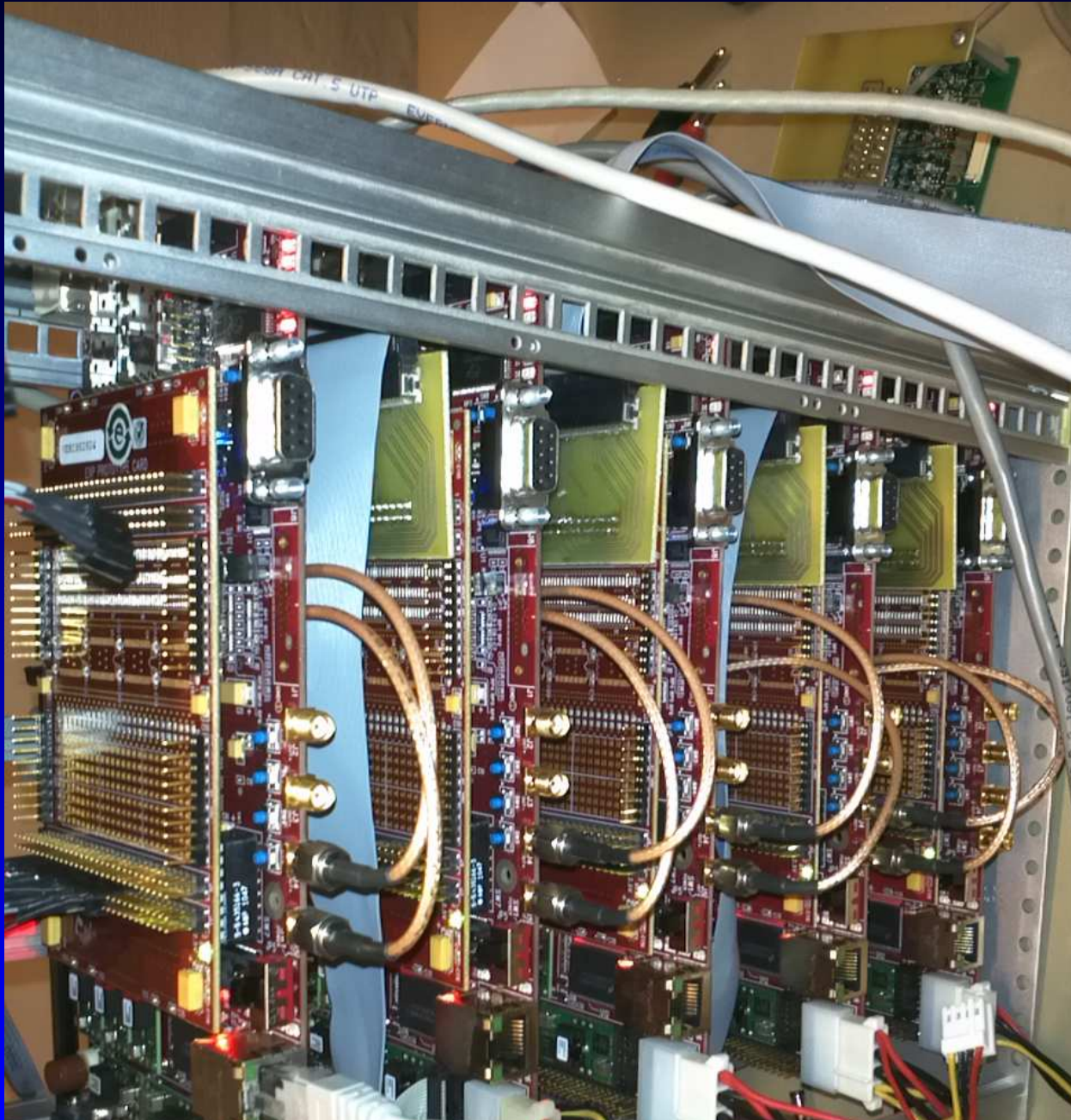


# COMPET readout





# COMPET readout II.





# Misc