Meeting with Makoto Tabata (Chiba University)

-> organized by the project; attended by pf(m/d)RICH representatives

- Presently produce 15cm x 15cm x 2.5cm tiles for J-PARC (n ~ 1.04)
- Shaped by water jetting

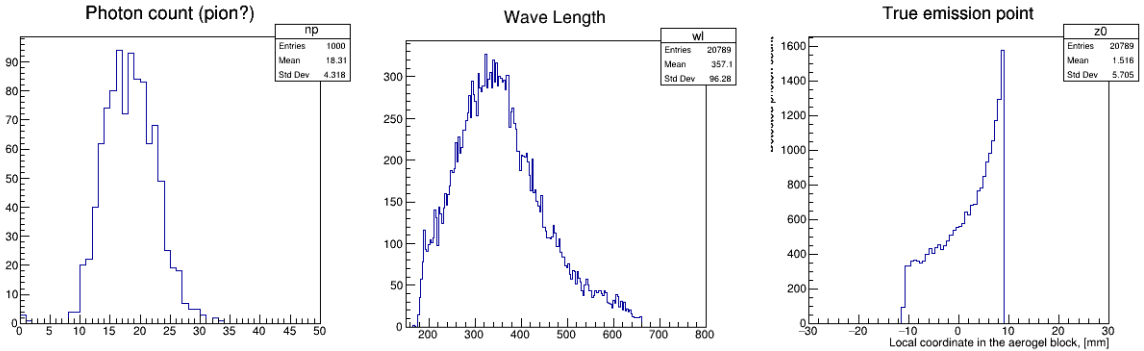
- Can go up to ~20cm size
- n-1 variation +/- 1.5%
- n ~ 1.03 is the easiest to produce, and it shows highest transparency

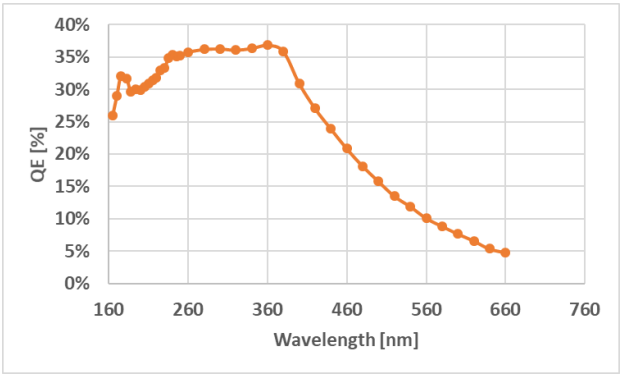
- Should be possible to produce ~5cm size tiles with optical quality sides
  - No water jetting (but a special mold needed)

- Next steps do be defined soon (formulate more specific requirements by ePIC, request samples for beam tests, etc)

Wavelength range (last week)

- Is it really hopeless to work with aerogel in a deep UV range?





HRPPD 126 QE curve

Belle II aerogel#1 in pfRICH GEANT simulations

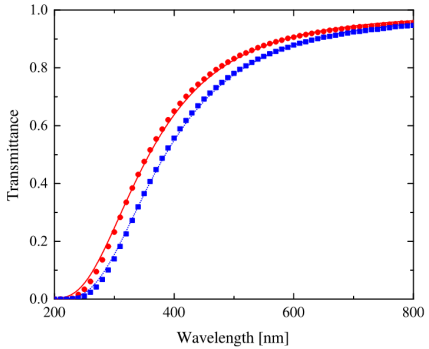


Fig. 2. Transmittance as a function of wavelength for the Belle II RICH aerogel samples of $n = 1.045$ (red) and 1.055 (blue) [2]. The thickness for both samples is 20 mm . (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

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<Property name="ABSLENGTH" unit="eV">
  <value energy="7.75">1.64386</value>
  <value energy="6.88889">5.77248</value>
  <value energy="5.91945">11.8578</value>
  <value energy="5.42017">15.8411</value>
  <value energy="5.17722">21.314</value>
```

~5mm @ 180nm (units: [mm])

$$\frac{dE}{dx} = 4\pi^2 e^2 \int_{\beta n > 1} \frac{1}{\lambda^3}\left(1 - \frac{1}{\beta^2 n^2}\right) d\lambda$$

~5mm @ 250nm (units: [mm])

```
<Property name="RAYLEIGH" unit="eV">
  <value energy="1.500">495.305</value>
  <value energy="1.675">368.992</value>
  <value energy="1.850">276.148</value>
  <value energy="2.025">208.910</value>
  <value energy="2.200">159.280</value>
  <value energy="2.375">122.311</value>
  <value energy="2.550">94.4909</value>
  <value energy="2.725">73.5915</value>
  <value energy="2.900">58.2796</value>
  <value energy="3.075">46.5131</value>
  <value energy="3.250">37.2842</value>
  <value energy="3.425">30.1133</value>
  <value energy="3.600">24.4282</value>
  <value energy="3.775">19.7740</value>
  <value energy="3.950">16.1085</value>
  <value energy="4.125">13.0108</value>
  <value energy="4.300">10.6804</value>
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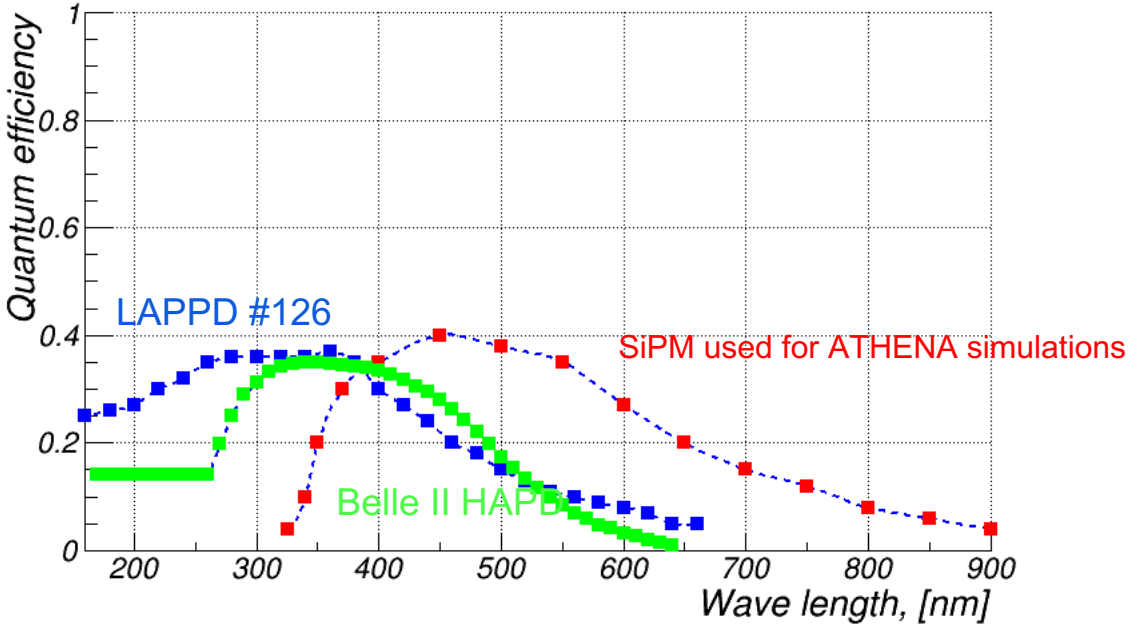
  <value energy="4.825">6.03070</value>
  <value energy="5.000">5.02443</value>
  <value energy="5.175">4.3785</value>
  <value energy="5.350">3.8331</value>
  <value energy="5.525">3.3701</value>
  <value energy="5.700">2.9749</value>
```

Obviously, more studies needed

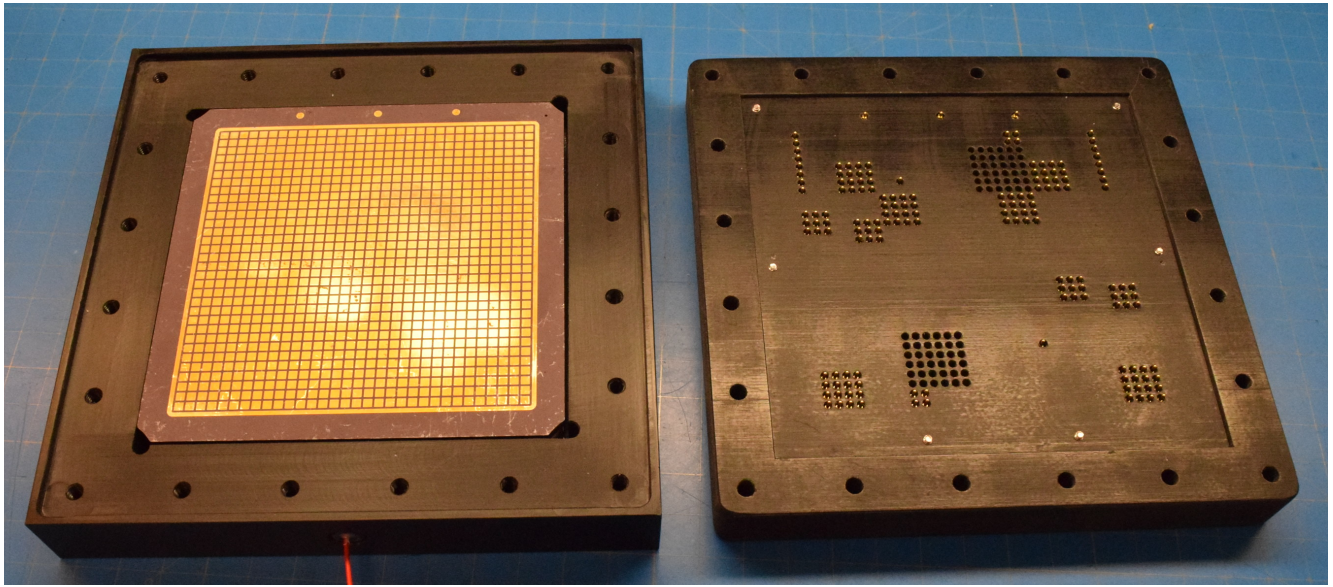
Wavelength range (update)

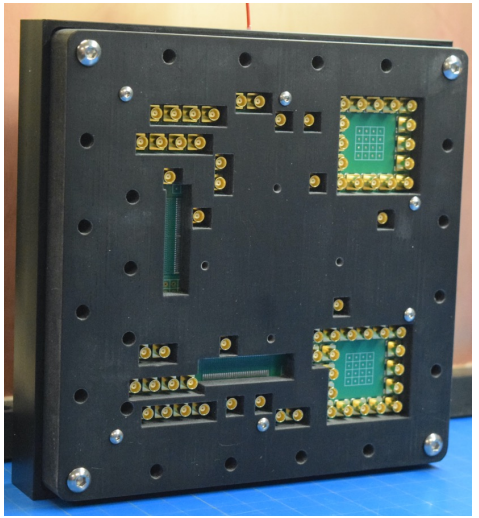


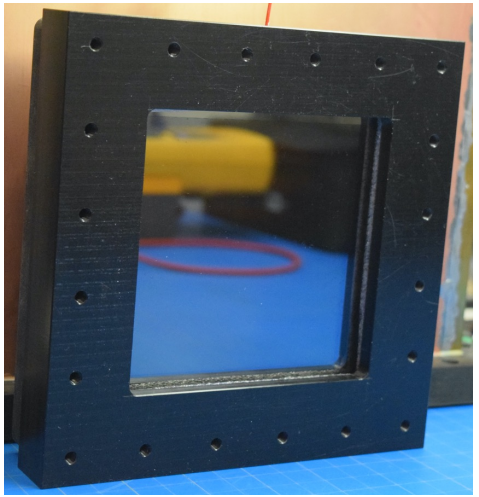
- Samo, Luka (Ljubljana): no acrylic filter used in Belle II
  - make use of all near UV photons within the HAPD QE range

-> we have all reasons to do the same in ePIC pfRICH

HRPPD evaluation



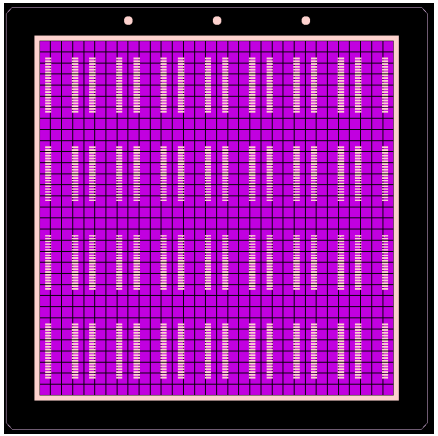




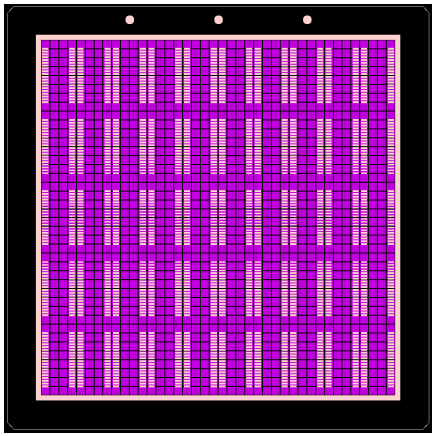
- All the ingredients are in place
- Mark Popecki from Incom visited BNL yesterday
  - The test bench setup works (and HRPPD #4 is functional)
  - First systematic measurements will be conducted before January 9th

HRPPD re-design effort for EIC

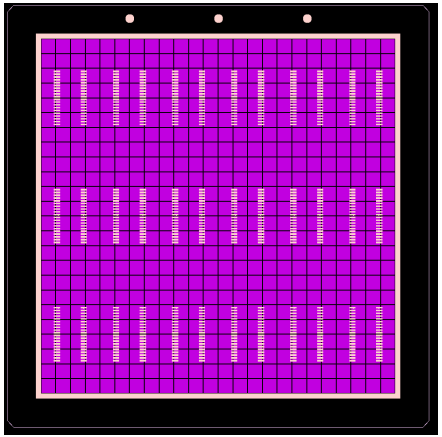
Variety of HRPPD anode base plate pixellation, with 40-pin Samtec connector footprints on the outer side



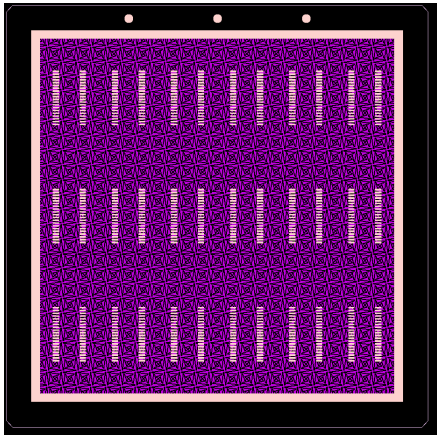
32 x 32 square pads
(present layout)



40 x 40 square pads
(DIRC)



24 x 24 square pads
(pfRICH)

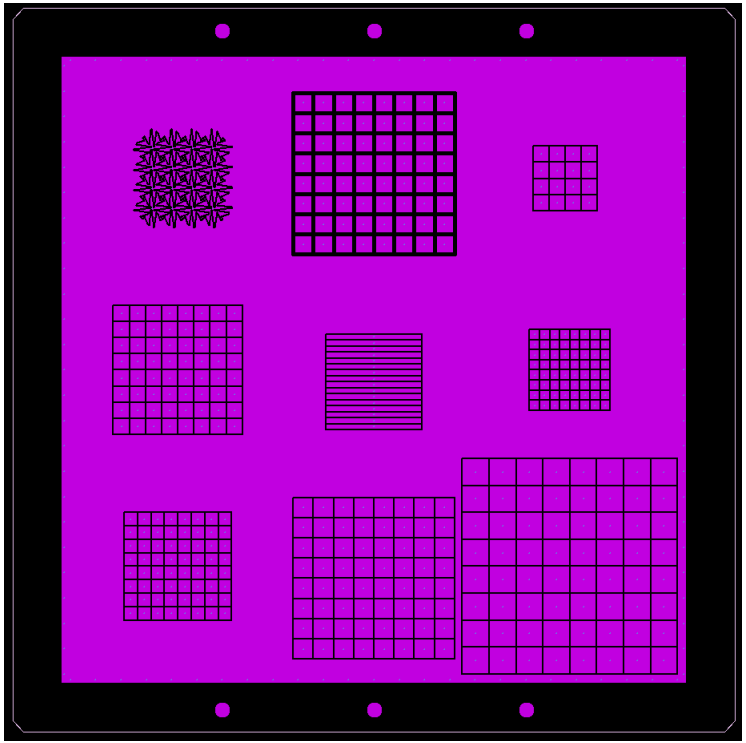


24 x 24 charge sharing
pads (pfRICH)

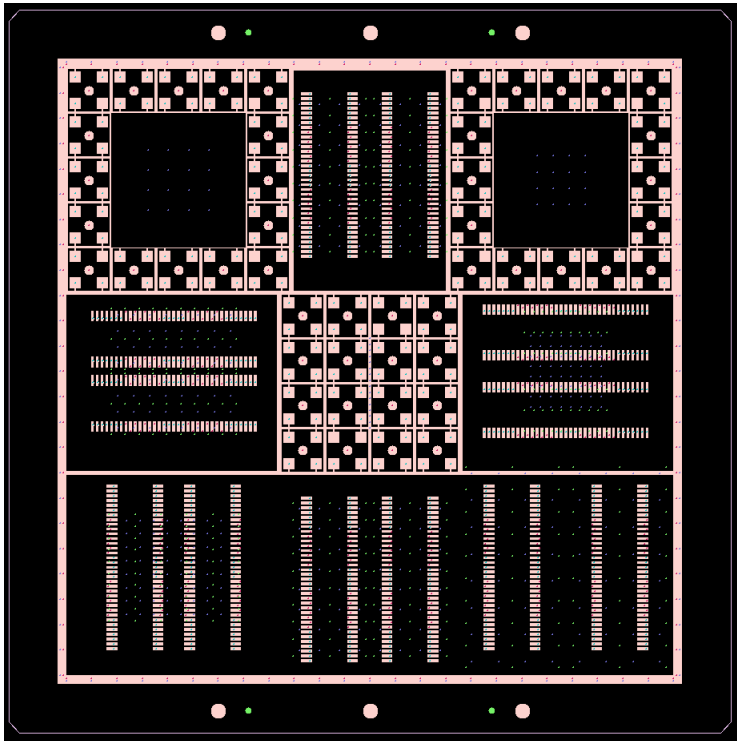
- Polish ceramic manufacturer (Techtra) claims they can produce such layouts in house
- First iteration will be a test bench HRPPD tile with a mixed layout, to test them all at once
  - AK to provide a final set of drawings for this layout
  - Tooling and fabrication will take 2-3 months

HRPPD re-design effort for EIC

pad (inner) size



connector (outer) side



- Will use existing side walls / windows; pad size tuned to the new active area size of 108 mm
  - Pixellation patterns 24x24, 32x32, 40x40, 48x48, 64x64 + 1D charge cloud profiling field

eRD110 funding & charge for m(pf)RICH groups

- LAPPD part of eRD110 FY23 proposal was funded in full
  - HRPPD rentals
  - Postdoc and travel support
  - HRPPD interface development
  - Magnetic field resilience studies

- We should prepare for a Collaboration review of e-endcap RICH proposals in March 2023