

## Precision and limits for loading

### FE

- ITkpix\_v1 chip depth is 150 um. There are some additional 'thicker' 400 um FE's but Elisabetta expects us to get only the 150 um for modules:
  - +/- 12.5 in (Maurice, by email)
  - For dicing: + 25 um - 5 um. There is also an uncertainty on the length in the long direction on support structures so Maurice recommends keeping the 200 um uncertainty for now.



2019-03-13\_FE\_Chip.pdf

### Quad sensor assemblies:

- The sensor is larger than the FE in one dimension, x: (40.7 mm + 50 um) x (39.1 mm + 5 um).
  - Sensor dicing precision is +50 um, - 0um. In x-y.
  - Sensor thinning in z is: +65 um, -15 um (from Koji, email).
  - Planar sensor is 100 um thick. for L1.
- Bump bonding is 25 um +0 um - 1.5 um
- On the quad there is an air gap of 250 um between FE. Since this is aligned to the pixel matrix it must have a um precision or less.



2019-03-13\_Quad\_Module\_100um.pdf

In terms of the flex, Jessica has presented: 40  $\mu\text{m}$   $\pm$  15  $\mu\text{m}$  glue thickness

### Triplet module assemblies

- Dicing and thinning precision for sensor assemblies for the single-chip planar that might be used in place of the 3D are the same as in quads.
- For the 3D sensors: 250 um +/- 20 um thick (from Koji, email). 20.3 +/- 50 um for (x,y).



2019-10-18\_Triplet\_Module\_3D.pdf

In terms of gluing the PCB to the 3 sensor assemblies, LBL is not doing assembly at all. Instead:

- Norway: pick & place machine with stamp. For the stamp, the hybrid is face-down, flattened by vacuum, and sensor assemblies are placed on the hybrid. There are concerns at Berkeley that Norway can not currently prove how flat things are. So far, parallelism and planarity tolerances have not been presented. **Machine can place within 20 um.**
- Genova: Elisabetta hasn't heard anything from them.
- Milan: pick & place like Norway. Pledged to do the same thing as Barcelona.
- Barcelona: have bought a pick-and-place with **5 um placement precision**. Elisabetta will go in December and see what they're up to.

Elisabetta has defined an overall planarity of +/- 25 um, so possibility of 50 um total non-planar.

PCB alignment is +/- 50 um in plane and (10%???) in Z. Ooo I found another document on EDMS.



R-z\_tripletGap.pdf

Lowered to height, vacuum released, sink under own weight.

He thinks the different bits having different thicknesses problem may be crucial. Can make slides to relate heights to spread?

Flex

Quad is currently: 150 - 25 + 50 um, should drop to +/- 25 um