# MVTX Geometry and Simulation Update

- New stave GDML file (mvtx_stave_v1.gdml) is available, which matches ALPIDE chip description and dimensions from ALICE implementation in its geometry software:
  - Fixes on the active matrix size and position in the chip -> Gives a accurate study of MVTX phi coverage with new layers configuration.

- Implementation of latest configuration for MVTX layers (next slides)
  - Change layer radius and stave tilt to improve stave overlaps on phi.
  - Add a phi rotation offset for first stave_0 -> to match real geometry

- Fixes some bugs in
  - Fix pixel sizes -> right number of pixels (512 x 1024) per chip
  - Fix a bug in function to get pixel number from local sensor coordinates.
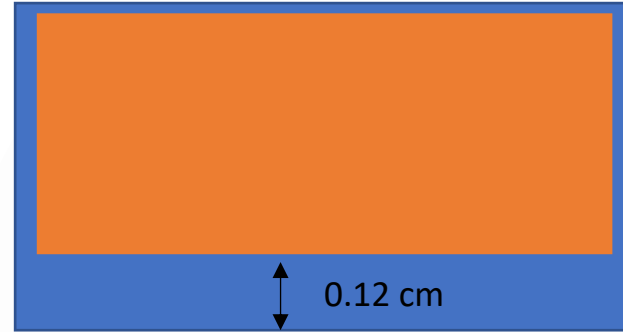
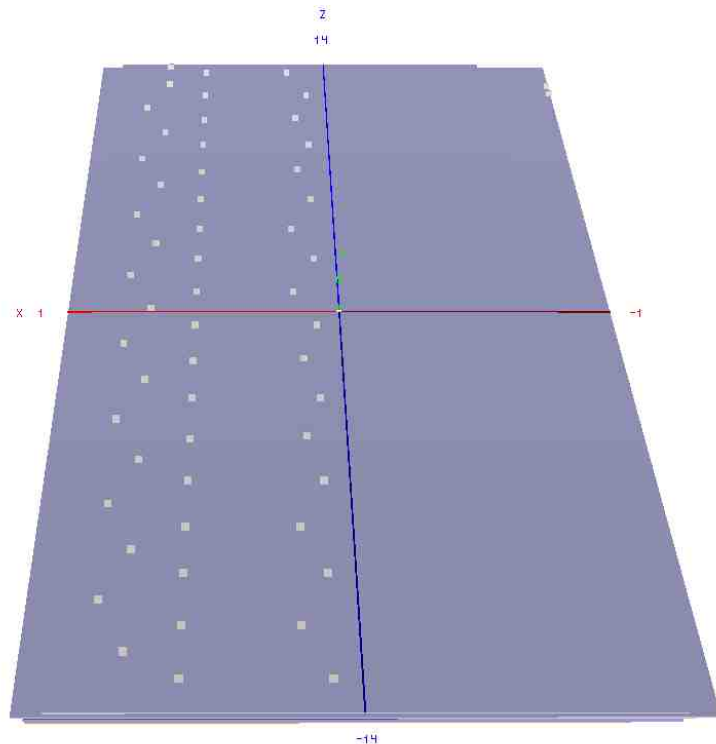# New stave GDML file (mvtx_stave_v1.gdml)

18 um
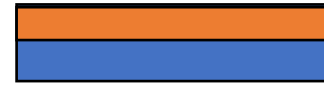
50 um Si
18 um Si

1.5 x 3.0 cm MAPS chip
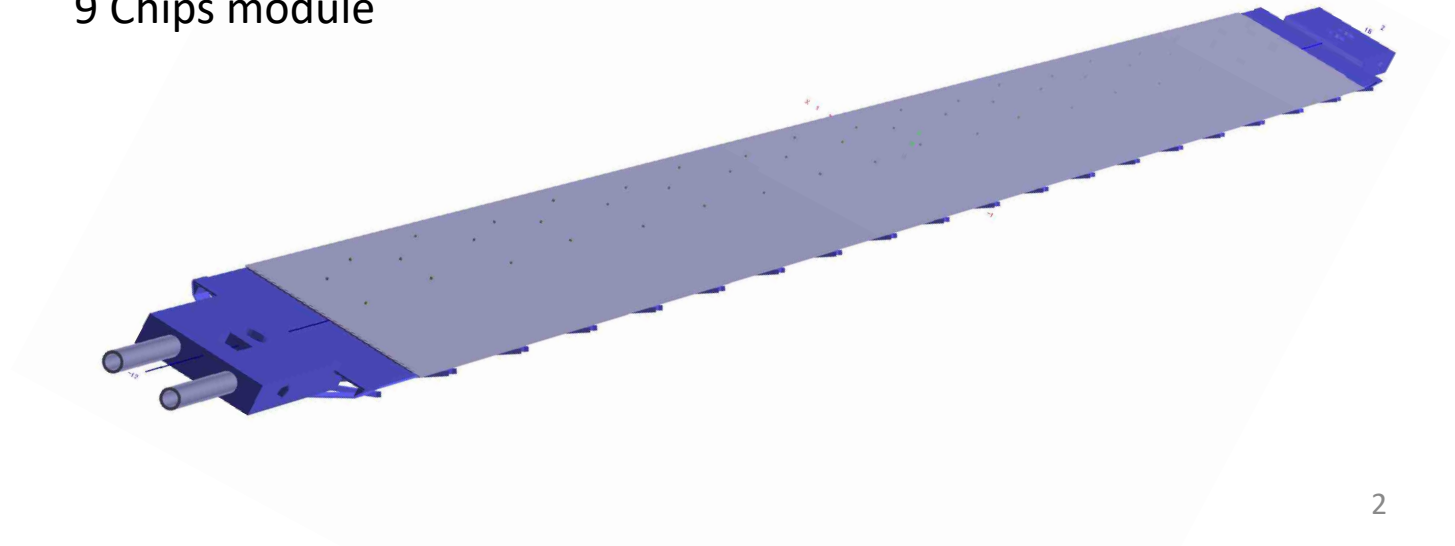
0.12 cm

50 um Si Chip
5 um Metal Stack
30 um Sensor

1.5 x 3.0 cm MAPS chip

9 Chips module

MVTX full coverage study
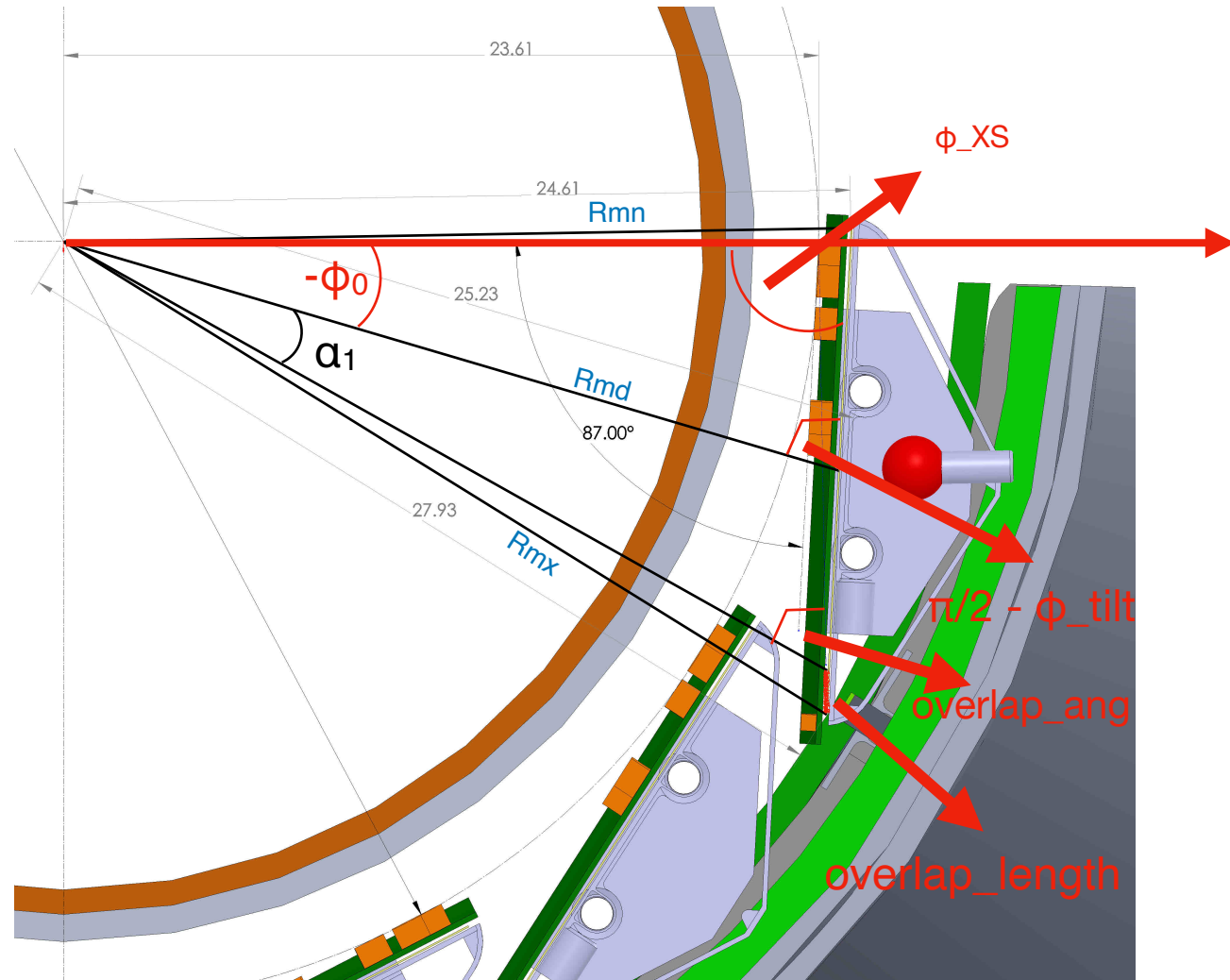
	L0	L1	L1 (New proposal)	L2
Rmn (mm)	24.613	32.25	31.98	39.93
Rmd (mm)	25.233	33.74	33.355	41.478
Rmx (mm)	27.93	36.73	36.25	44.26
φ_XS (deg)	87	95.5	95.5	97.5
φ_tilt (rad)	0.233	0.310	0.295	0.297
Φ_0 (rad)	0.2847	0.214	0.1986	0.1664
overlap_len (mm)	1.30	1.09	1.33	1.42

Nose view (+Z)

overlap_len must be > 1.2 mm
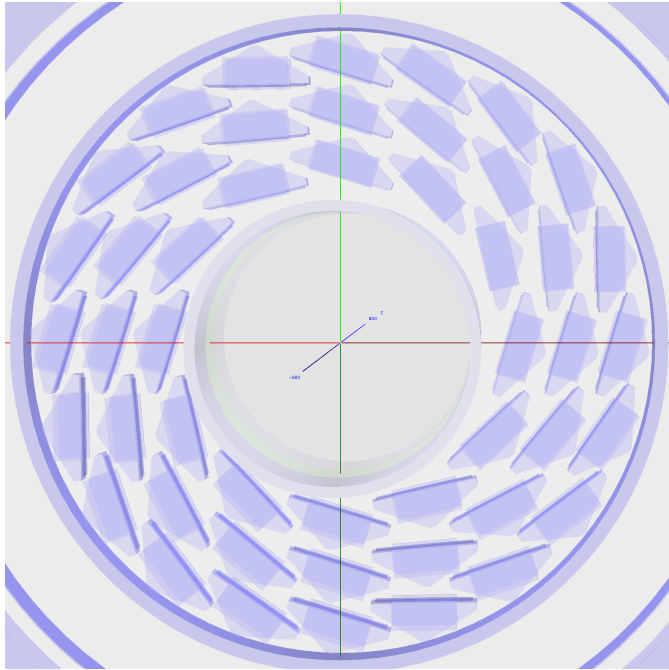
$$\phi\_tilt = asin((Rmx^2 - Rmn^2) / (2*Rmd*sensW));$$
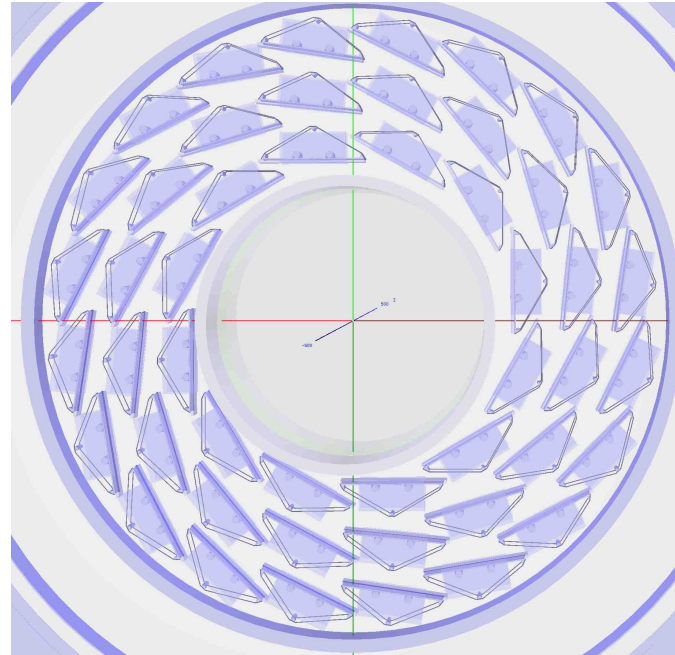
$$\phi_0 = deg2rad(\phi\_XS) - \pi/2 - \phi\_tilt;$$

$$overlap\_len = sensW/2 - (Rmd*sin(\alpha_1)/sin(overlap\_ang));$$

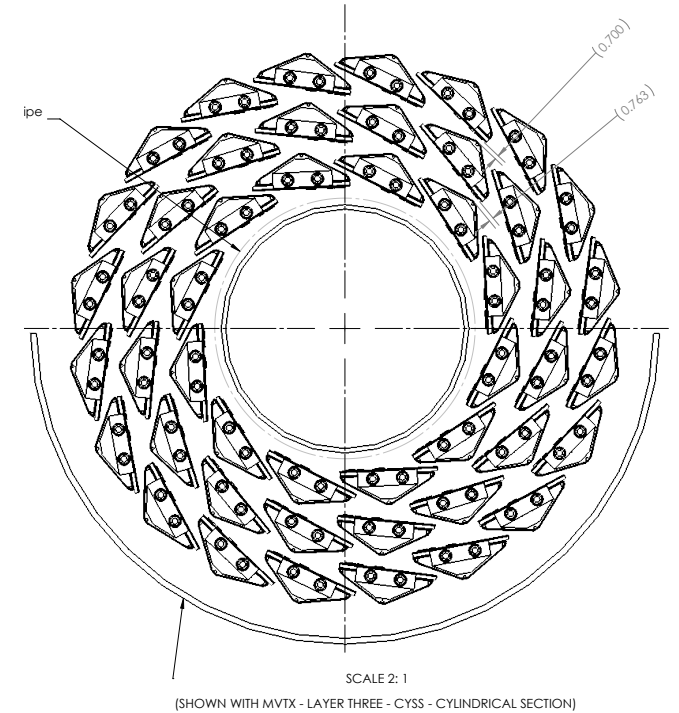# MVTX Geometry and Simulation Update (cont.)

MVTX geom in Geant4 (cone view)

MVTX assembly drawing

Current

New

SCALE 2: 1

(SHOWN WITH MVTX - LAYER THREE - CYSS - CYLINDRICAL SECTION)

Fix some bugs

- Adjust pixel size for a 1024x512 Active sensor matrix, 30x30 um -> 29.24 x 26.88 um
- Remove a lot of unused code inherited from ALICE OB modules
- Changes in the algorithm from/to pixel to/from local location in sensor.