

STT Module Geometry

R. Petti

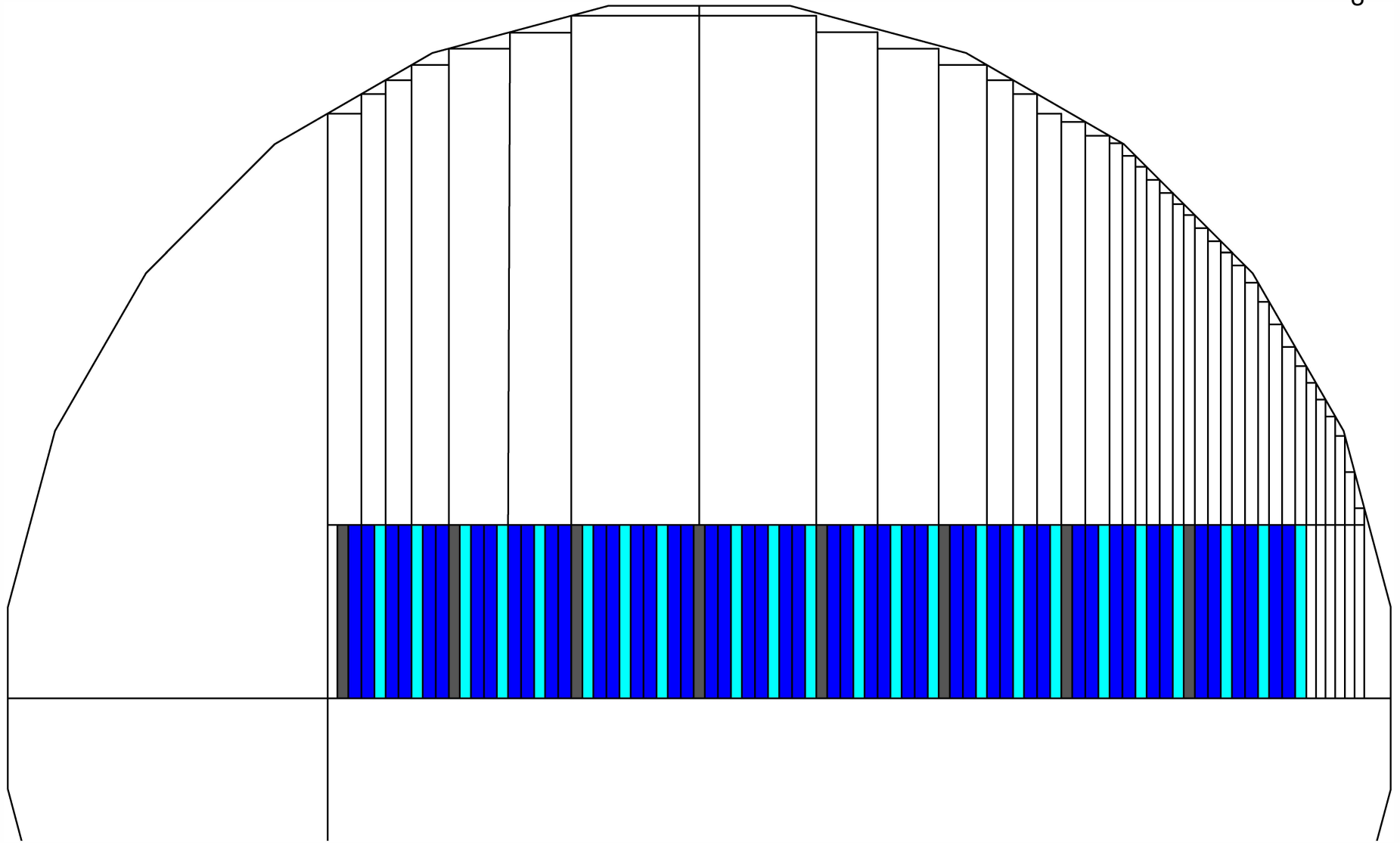
University of South Carolina, Columbia SC, USA

*STT Working Group meeting
August 7th 2024*

SIMPLIFIED MODULE GEOMETRY

2

- ◆ *Solenoidal geometry of KLOE magnet implies a variable height for most STT modules
⇒ Trade-off between acceptance and assembly optimization*
- ◆ *Simplify STT geometry by reducing the number of variants across the 86 modules*
- ◆ *Symmetric placement with respect to central diameter reduces module variants by a factor two for the first 6 super-modules*
- ◆ *Further standardization of module height within the first 6 super-modules*



Schematic drawing illustrating the vertical alignment of the modules for default STT

DIMENSIONAL VARIANTS OF STT MODULES

- ◆ *All 86 STT modules have the same width ~ 3.2 m*

- ◆ *Total of 31 different heights:*
 - *20 STT modules with maximal height ~ 3.9 m;*
 - *40 STT modules split among 6 different heights*
 - ⇒ *60 STT modules ($\sim 70\%$ of total) characterized by 7 heights*
 - *Remaining 26 STT modules characterized by 24 different heights*
 - ⇒ *Smaller modules downstream more critical for STT acceptance*

- ◆ *Frame vendor(s) confirmed all 86 frames can be manufactured with common tooling designed for the largest central ones*

◆ *Self-alignment of straws during assembly:*

- *Pressurized straws in closely packed layers aligned by frame straw holders & profiles on table;*
- *Simple flat bars used to push down straw layers during gluing process.*

◆ *Self-centering of wires:*

- *Insensitive to misalignments of endplugs & crimping pins allowing loose tolerances;*
- *Extra spacers close to straw ends provide accurate wire centering ($<100 \mu\text{m}$);*
- *Larger ID of crimping pins & conical hole shape in spacer for easier insertion of wires.*

◆ *Assembly tolerances not critical once wires self-centered:*

- *Main requirement location of wire positions within STT volume;*
- *High-statistics samples of crossing muons from rock events allow direct in-situ alignment of wires
→ Average of 9,561 muons/straw in one week, with ALL 219,334 straws $\gtrsim 2,000$ muons/week*
- *Similar in-situ alignment procedure used by NOMAD;*
- *No need for dedicated X-ray scans of STT modules.*

⇒ *Relaxed requirements on tooling & assembly procedure for STT*

Backup slides