

# Stacking tests

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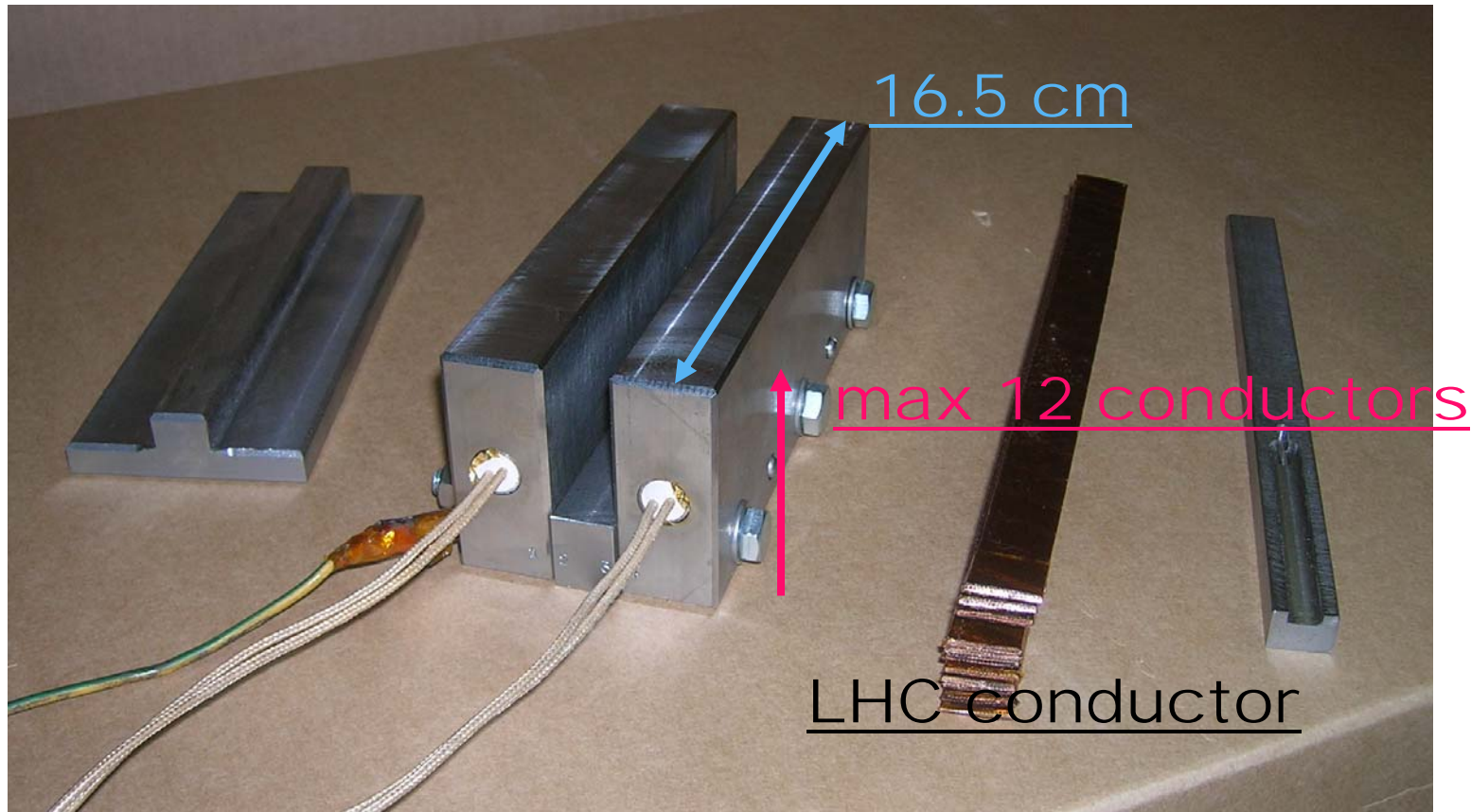
# Motivations

- The knowledge of conductor mechanical properties is fundamental to study winding deformations
- we have full information on LHC cable (different insulation and no stainless steel strip inside Rutherford)
- no mechanical information on SIS300 cable

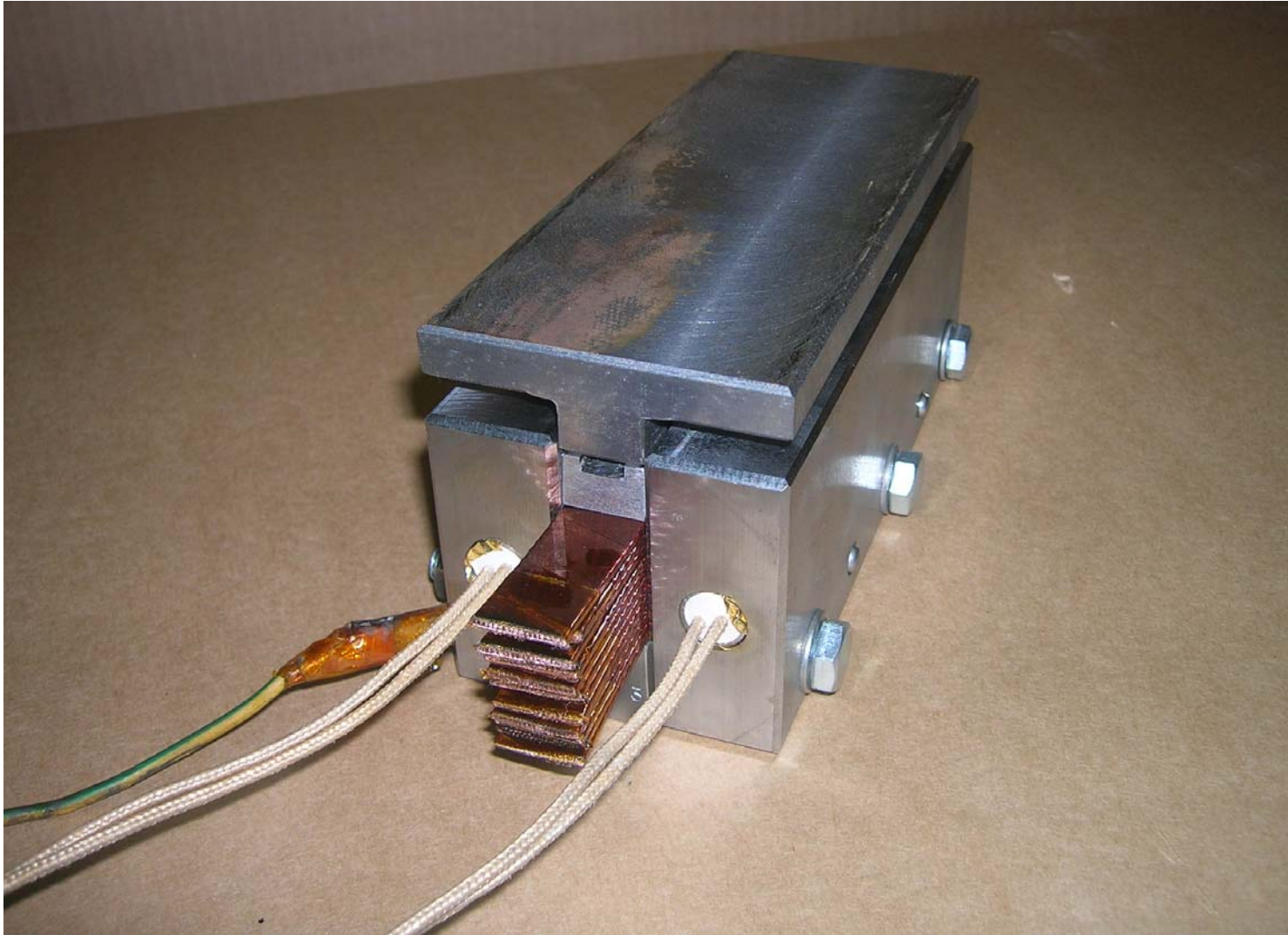


we need to measure the mechanical  
behavior of our conductor

# Stacking tests: sample preparation (1/2)



## Stacking tests: sample preparation (2/2)

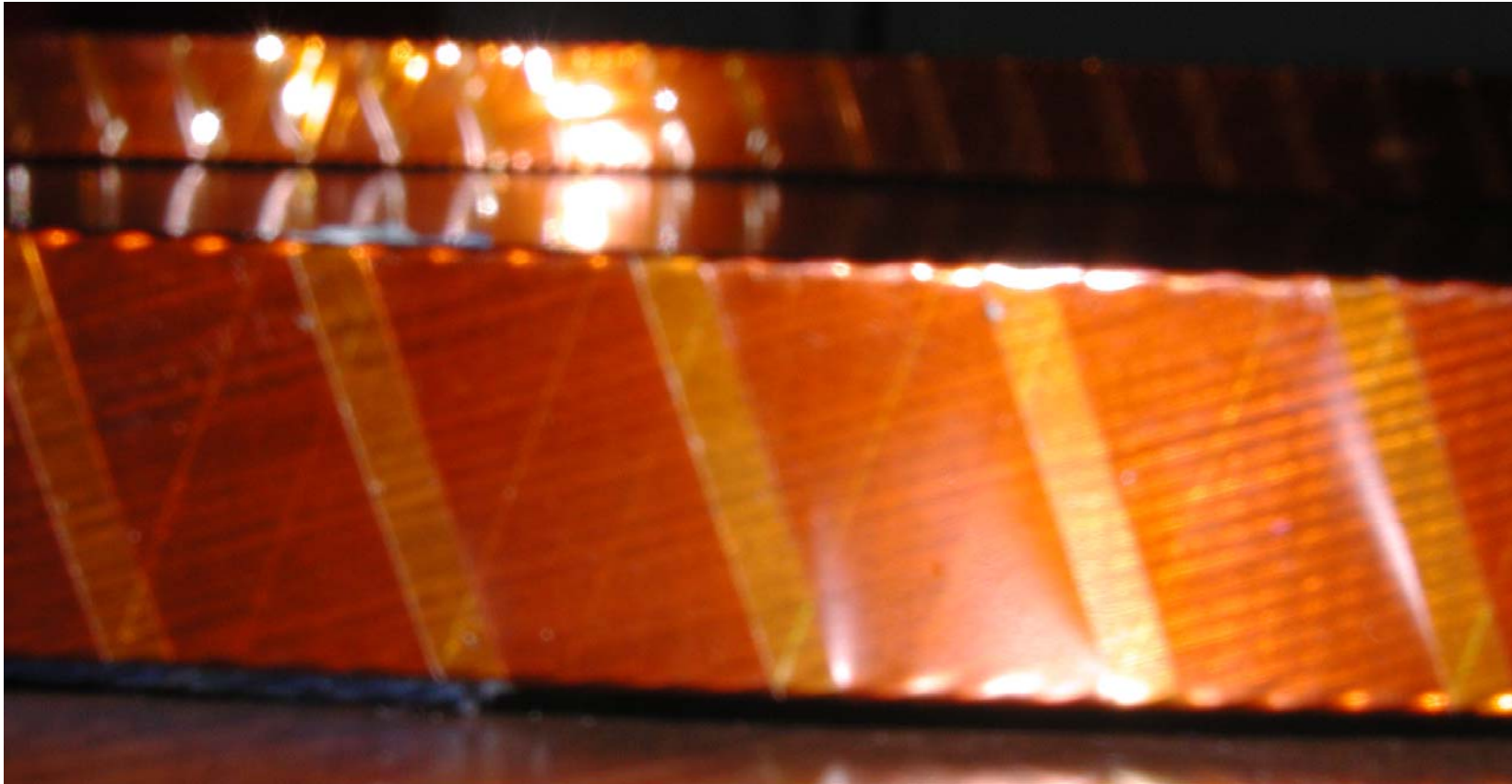


# Stacking tests: sample description

- We are going to prepare (using LHC cable):
  - 2 stacks of 12 conductor 16.5 cm long to be measured in compression at ASG
  - 2 stacks of 10 conductors 10 cm long to be measured in compression at LASA
  - 2 stacks of 6 conductors 16.5 cm long to be measured in tension (longitudinally) at LASA
- If needed, more samples made with the LHC cable will follow
- Once the procedure is established, we will start preparing samples using the GSI cable



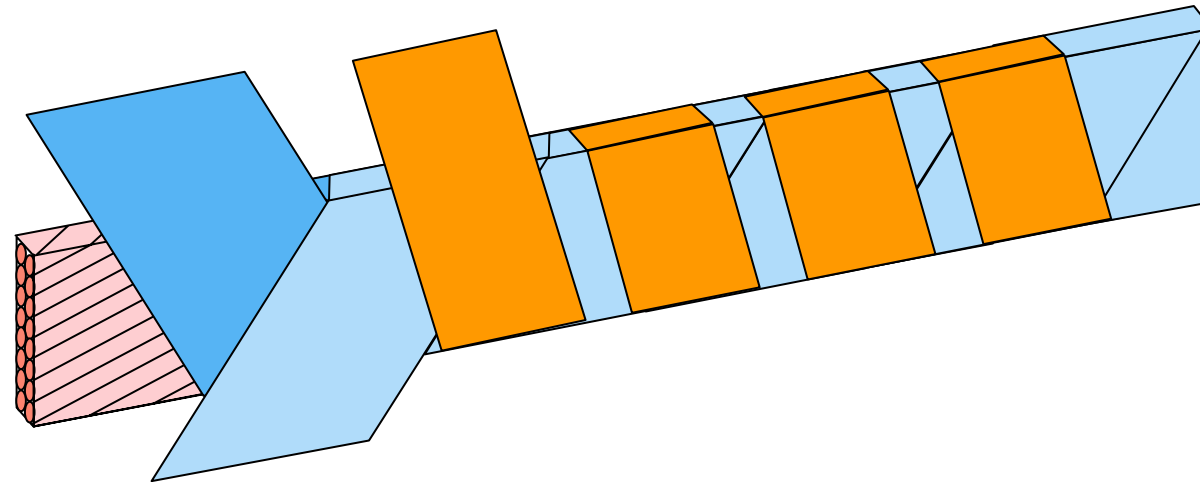
# GSI cable



# LHC conductor insulation

1<sup>st</sup> layer: Kapton HN  
50  $\mu\text{m}$  thick  
11 mm wide  
wound side to side

3<sup>rd</sup> layer: adhesive Kapton HN  
68  $\mu\text{m}$  thick  
9 mm wide  
wound with 2 mm gap

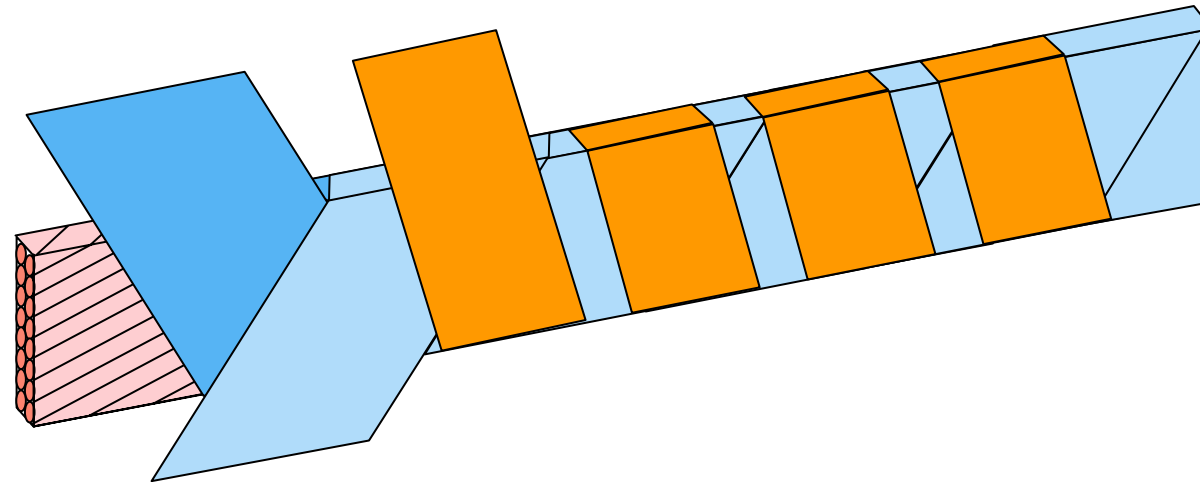


2<sup>nd</sup> layer: Kapton HN  
50  $\mu\text{m}$  thick  
11 mm wide  
wound side to side

# GSI conductor insulation (as received)

1<sup>st</sup> layer: Kapton HN  
25  $\mu\text{m}$  thick  
11 mm wide  
wound side to side

3<sup>rd</sup> layer: Kapton HN  
50  $\mu\text{m}$  thick  
9 mm wide  
wound with 2 mm gap

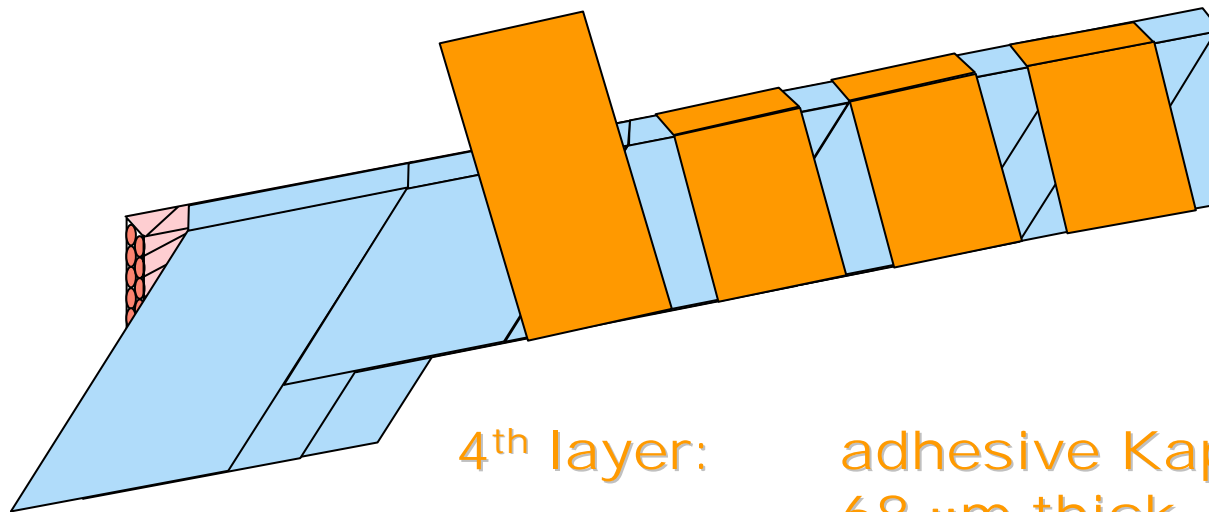


2<sup>nd</sup> layer: Kapton HN  
50  $\mu\text{m}$  thick  
11 mm wide  
wound side to side



# ASG proposal for SIS300 insulation

1<sup>st</sup> 3 layers: Kapton HN  
25  $\mu\text{m}$  thick  
11 mm wide  
wound 2/3 overlapped



4<sup>th</sup> layer: adhesive Kapton HN  
68  $\mu\text{m}$  thick  
9 mm wide  
wound with 2 mm gap

# First stack of 12 LHC conductors

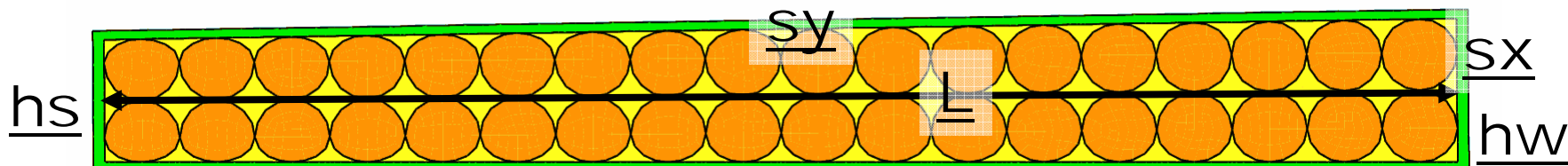


total thickness: 21.3 mm

average thickness  
of 1 conductor (@ 0MPa): 1.775 mm

calculated average thickness  
of 1 conductor (@ 50MPa): 1.763 mm

# LHC conductor dimensions @ 50 MPa



<b><u>bare conductor</u></b>	<b><u>LHC</u></b>	<b><u>SIS300</u></b>
short side thickness ( $h_s$ )	1.362 mm	1.362 mm
wide side thickness ( $h_w$ )	1.598 mm	1.598 mm
width (L)	15.10 mm	15.10 mm
<b><u>insulation</u></b>		
radial thickness ( $s_x$ )	<b>150 <math>\mu\text{m}</math></b>	<b>125 <math>\mu\text{m}</math></b>
azimuthal thickness ( $s_y$ )	<b>141.6 <math>\mu\text{m}</math></b>	<b>98 <math>\mu\text{m}</math></b>

**-5.6%**

**-21.6%**



◆ We can foresee a discrepancy between our measurements and the given dimensions of SIS300 cable

◆ It would be useful to have more information on the origin of those dimensions