



CERN – 09th July 2015



University of Twente
Enschede - The Netherlands

TASK 5.5 - Conductor Studies

First Proposal



EuroCirCol Meeting – WP5





Wire Diameter & Layout

Starting Point



- In order to better use synergies with the HiLumi project, the 0.85 mm wire seems to be the best starting point
- A 1 mm wire might be an alternative option in the case it would be necessary to reduce the inductance of the magnet
- RRP 108/127 (55 μm in a 0.85 mm wire with Cu/Non-Cu=1.2)
 - Alternative 132/169 (50 μm in a 0.85 mm wire with Cu/Non-Cu=1.2)
- PIT with 192 Sub-Elements (41 μm in a 0.85 mm wire with Cu/Non-Cu=1.2)



Relevant Wire Studies

- I_c versus transversal pressure - Unige
- I_c versus longitudinal strain – Twente, Unige
- I_c Temperature Dependence – Twente, UniGe
- Magnetization Temperature Dependence, D_{eff} – CERN
- Magneto Thermal Stability – CERN
- Specific Heat, Thermal Conductivity – Unige, Twente



Relevant Cable Studies

- I_c versus transversal pressure – Twente, CERN
- Inter-strand Resistance – Twente
- Effect of large heat capacity compounds in the impregnation: training, MQE, quench propagation velocity - CERN



Key Studies



- Correlate the wire measurements under transversal pressure carried out at UniGe with cable measurements
 - Sub-cable (18 wires → about 8 mm width ?) measured at CERN and Twente for benchmarking
 - Full size cable (most likely 40 wire) measured at Twente
- Verify the compatibility of high J_e with large transversal pressure on the conductor
 - With the present wire design, can we go for relatively large sub-elements and large Sn content?



Possible Initial Activity at Unige



- I_c versus transversal pressure
 - 0.85 RRP 108/127 Regular-Sn, Ti-doped
 1. Goal: Study the impact of reduced-Sn on electromechanical behavior
 2. Reduced-Sn Ti-doped already measured by UniGe (HiLumi wire)
 - The effect of the layout has been already assessed by UniGe
 1. 132/169 more tolerant to transversal pressure than the 108/127 (at least for the reduced tin)

- I_c versus longitudinal strain
 - 0.85 RRP 108/127 Regular-Sn, Ti-doped
 - 0.85 RRP 132/169 Regular-Sn, Ti-doped



Possible Initial Activity at Twente



- I_c versus longitudinal strain

- 0.85 RRP 108/127 Regular-Sn, Ti-doped
- 0.85 RRP 132/169 Regular-Sn, Ti-doped

- I_c versus temperature

- 0.85 RRP 108/127 Regular-Sn, Ti-doped
- 0.85 RRP 108/127 Reduced-Sn, Ti-doped



Possible Initial Activity at CERN

- Magnetization versus temperature
 - 0.85 RRP 108/127 Regular-Sn, Ti-doped
 - 0.85 RRP 108/127 Reduced-Sn, Ti-doped
- Manufacture and characterization of a sub-cable
 - Cable Design and wire procurement
 - I_c degradation
 - RRR degradation