

Collimation ECRs

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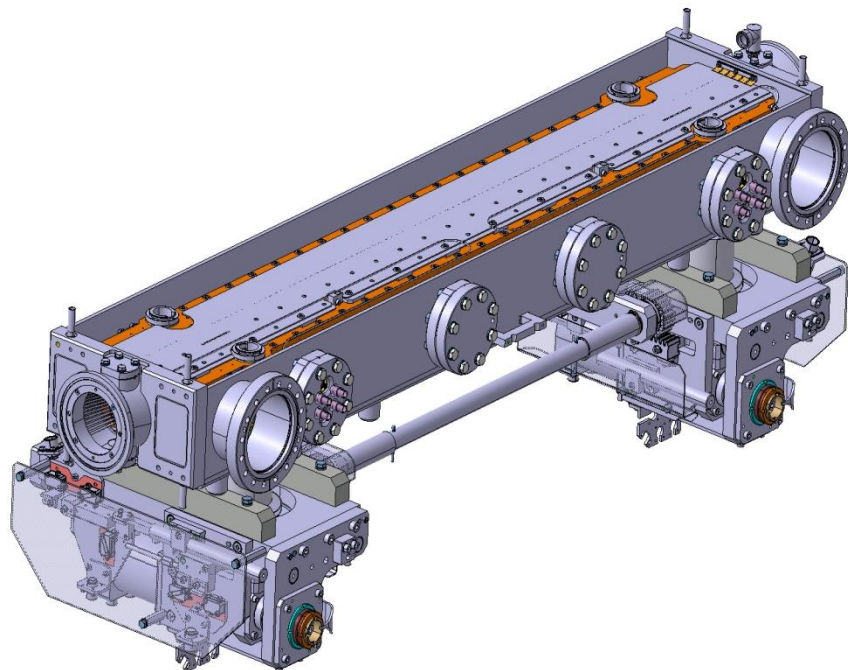
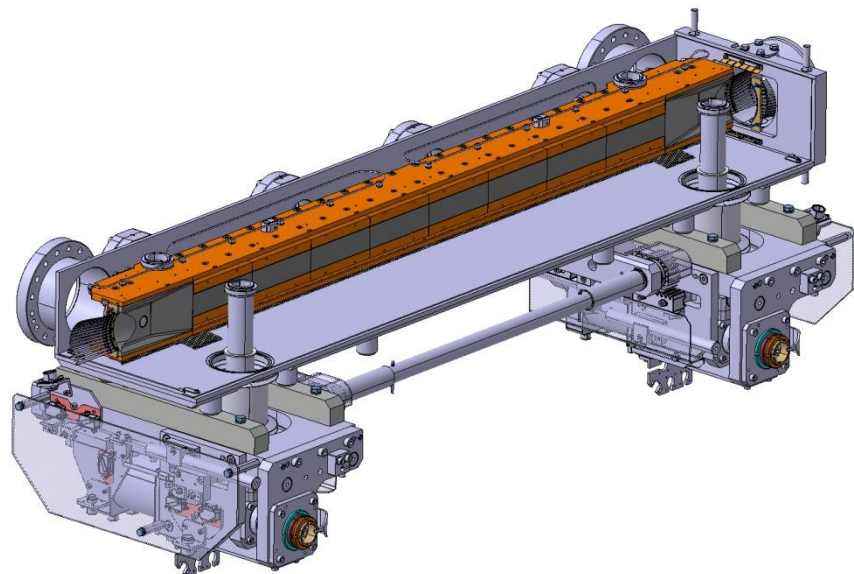
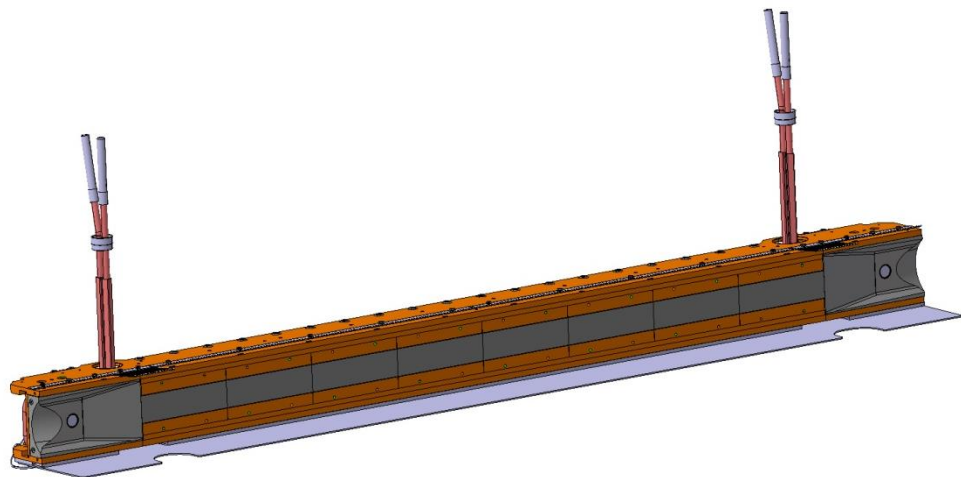
on behalf of the WP5 and collimation teams

Overview of ECRs

- Several ECRs for collimation works in the EYETS 2016-2017 under review
 - **TCSPM**: install a prototype of a secondary collimator with new low-impedance material
 - **TCPP**: install a new primary collimator with BPM buttons
 - **Crystal**: install 2 new crystals with improved goniometers in B2
 - **Wire collimators**: install 2 units with integrated wires in IR5, for test of wire compensation of long-range beam-beam
- Work carried out in close collaboration between many groups: ABP, STI, MME, BI, VAC, integration....

- Low-impedance secondary collimators in IR7 **part of the HL upgrade**
 - MoGr + coating instead of CFC provides a 90% reduction of the impedance
- Prototype under construction at CERN by EN/MME, paid by WP5
 - Design includes **3 longitudinal stripes of coating**: Mo, TiN and uncoated MoGr
 - 10 mm wide areas, 5 μm thick coating
 - Different surfaces exposed to beam by moving along the 5th axis (see ColUSM 27/5/2016)
 - Includes also **in-jaw BPM buttons**
 - New MoGr tapering
 - Otherwise similar to existing TCSGs

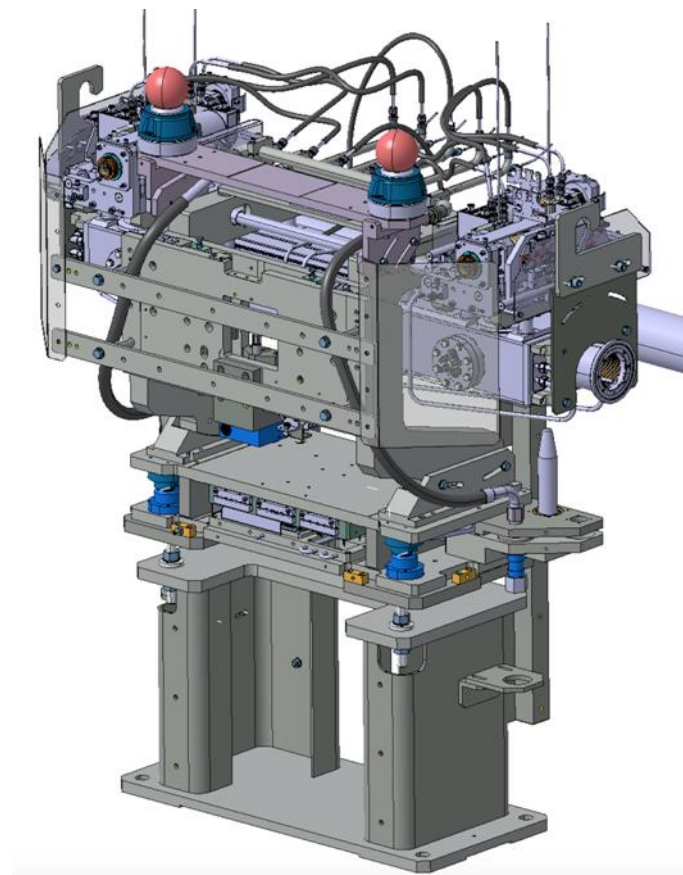
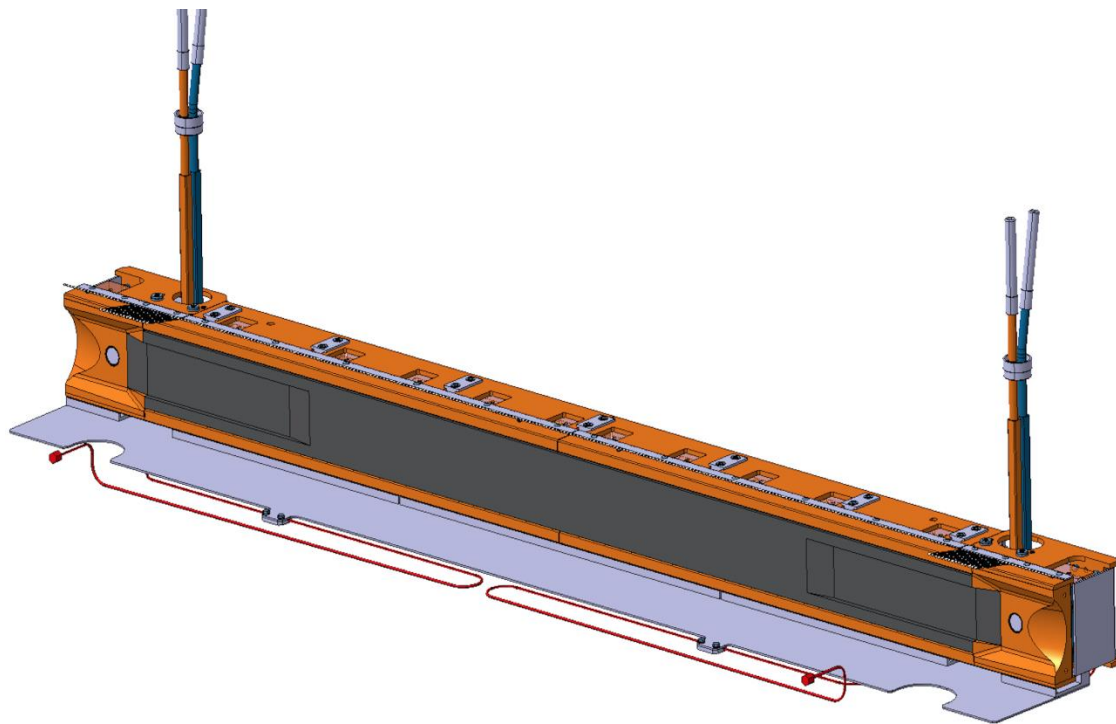
TCSPM



- Planned to install prototype in empty upgrade slot next to **TCSG.D4R7.B2**, keeping the existing TCSG
 - Vertical TCSG with highest individual impedance contribution
 - Vertical plane: Cannot be hit by asynchronous dumps
 - Cabling prepared already in LS1
- Should be ready for installation in February 2017
 - detailed schedule discussed in HiColDem meeting (HL-LHC Collimators: Design, Engineering and Prototyping) 14/7
- Primary goal is **use in impedance MDs**, but it is a fully functioning collimator
- EDMS document 1705738

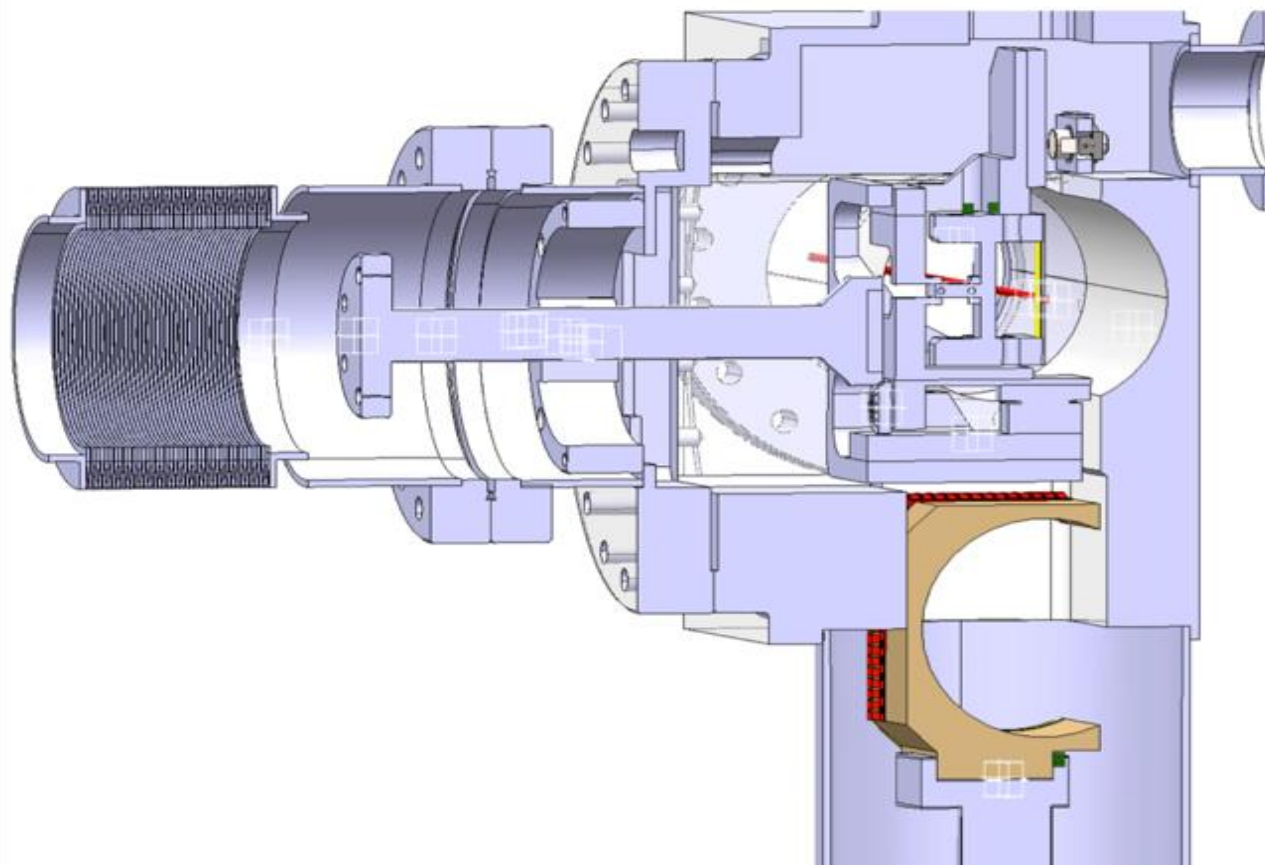
- New design of primary collimator developed including **BPM buttons**
 - Similar to existing TCP except for the BPMs
 - Collimator design with in-jaw BPMs successfully deployed on other collimators (TCTs, TCSP)
 - Allows a very large gain in alignment time
 - Allows continues accurate monitoring of the orbit at the collimator
- Prototype already built at Cinel and is ready for installation
 - Paid by Consolidation project and LHC collimation project
- Plan: replace the horizontal primary in IR7, B1, by the prototype
 - Allow validation of design

T CPP



- Already installed 2 crystals on B1, and several successful MDs carried out, but also some issues
 - Goniometer not bakable above 110 deg
 - Goniometer mechanics is not optimum for the precise sub-rad control of the angular position during executions of LHC ramp functions
 - Bending angle of crystals were off by 25% from design value
- Planned to install new goniometers, based on improved design, and new crystals on B2 (H+V)
 - Will allow to validate new design with beam tests
 - Having crystals on both beams allows more complete operational tests

- View of goniometer



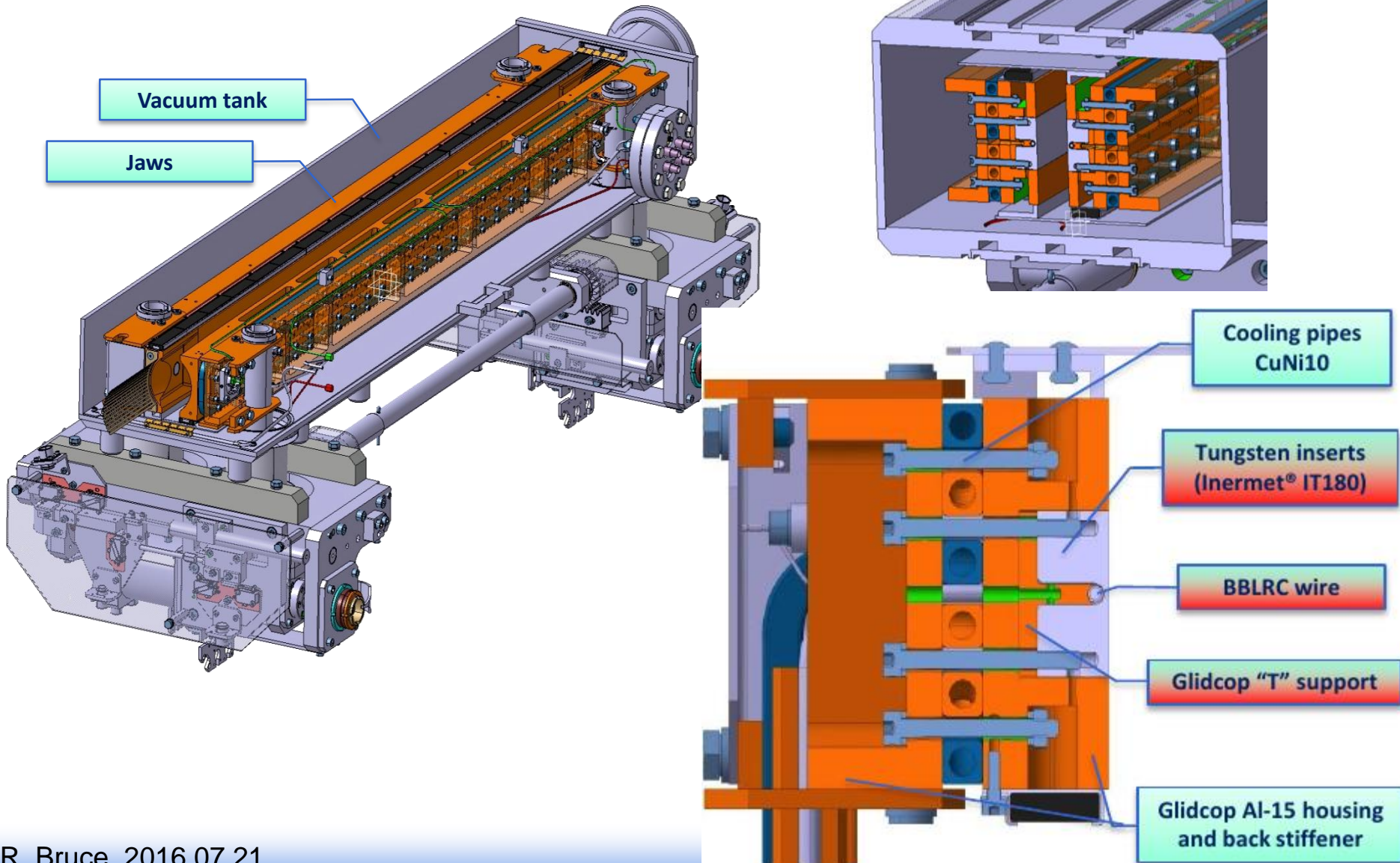
Crystals

- Vertical goniometer to be installed in new slot 2m from TCSM.6R7.B1 (equivalent to B1 installation)
- Horizontal goniometer: Equivalent B1 slot taken by TCSPM
 - New proposed slot: TCSM.A5R7.B2
- Installation of dedicated BLMs required
- Paid by WP5, except for cabling, and crystals provided by UA-9

Wire collimators

- Goal: replace two existing collimators in IR5 with new ones with built-in wires for tests of long-range beam-beam compensation (collaboration ABP – BI)
 - TCTPH.4R5.B2 (incoming beam) and TCL.4L5.B2 (outgoing beam), both horizontal (crossing plane)
- Design based on present TCTP (includes BPMs), but with Cu wires embedded in tungsten jaws and glidcop “T” insert for heat conduction

Wire collimators



Wire collimators

- The wire should be used / powered only in dedicated MDs
 - Cooling designed for maximum current of 378 A.
- During the rest of the time: to be used as standard collimators during normal operation
 - Fulfill the same demands on robustness etc
- EDMS document 1705791

Summary

- 4 collimation ECRs out for approval for EYETS installation
 - TCSPM
 - TCPP
 - Crystals
 - Wire collimators
- Looking forward to your feedback