

# Status of the SC-linac: report from the “coupler task force”

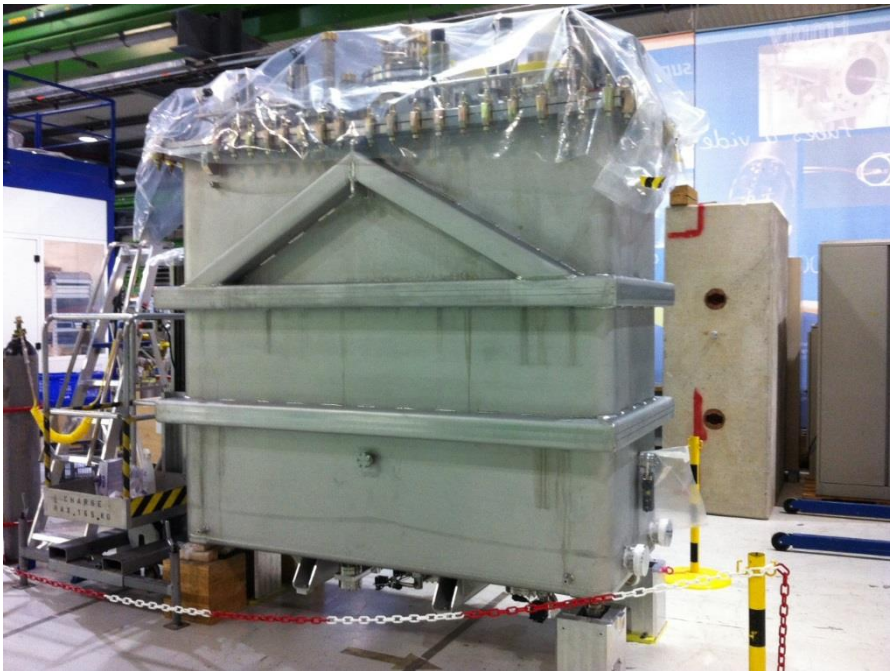
Walter Venturini Delsolaro  
on behalf of the **HIE ISOLDE** project team  
and the “coupler task force”

# Content

- Status of SC linac (CM1 and CM2)
- Update on the RF lines/couplers issue
- Next steps on roadmap into 2016 physics at 5.5 MeV/u

# Status of CM1 and CM2

CM1 uninstalled, waiting to be fixed in SM18



CM2 fully assembled with “new” couplers



# RF couplers issue: recap

- Anomalies in coupler behaviour noticed during commissioning in July 2015
- Mitigation measures introduced for the physics run (limiting field and runtime)
- Coupler task force at work during August-December 2015:
- All hypotheses, simulations, experiments, prototyping, validation of solutions documented in:

<https://edms.cern.ch/document/1536619/1>

<https://edms.cern.ch/document/1539539/1>

<https://edms.cern.ch/document/1539542/1>

<https://edms.cern.ch/document/1541497/1>

<https://edms.cern.ch/document/1543024/1>

<https://edms.cern.ch/document/1551204/1>

<https://edms.cern.ch/document/1551205/1>

<https://edms.cern.ch/document/1555124/1>

<https://edms.cern.ch/document/1556843/1>

<https://edms.cern.ch/document/1558989/1>

<https://edms.cern.ch/document/1560717/1>

<https://edms.cern.ch/document/1562767/1>

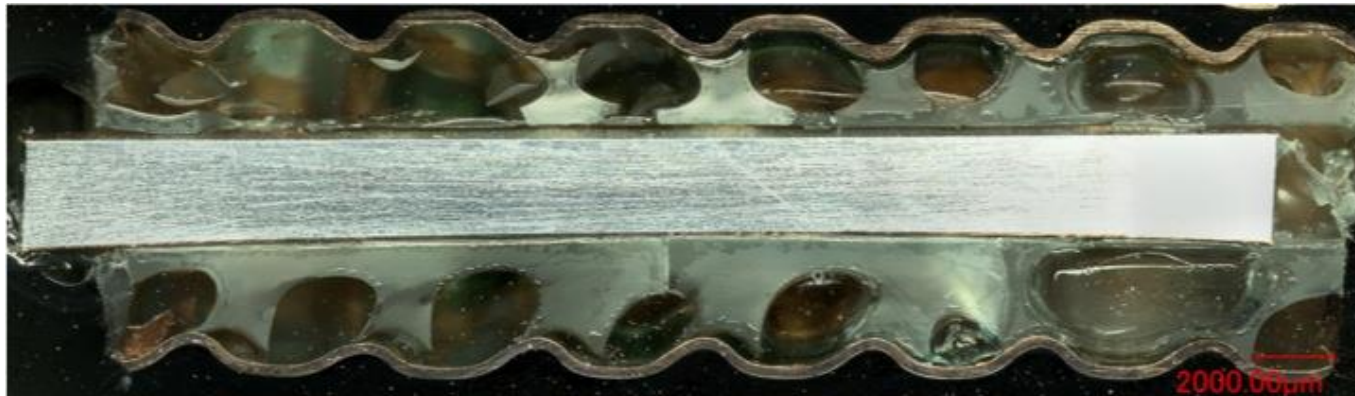
<https://edms.cern.ch/document/1566884/1>

- Task force members: A. Boucherie, J. Bremer, L. Dufay Chanat, T. Koettig, Y. Leclercq, E. Montesinos, A. Miyazaki, V. Parma, S. Teixeira, M. Therasse, L. Valdarno, D. Valuch, G. Vandoni, W. Venturini Delsolaro, P. Zhang.

# Stress test in vertical cryostat (July 2015)

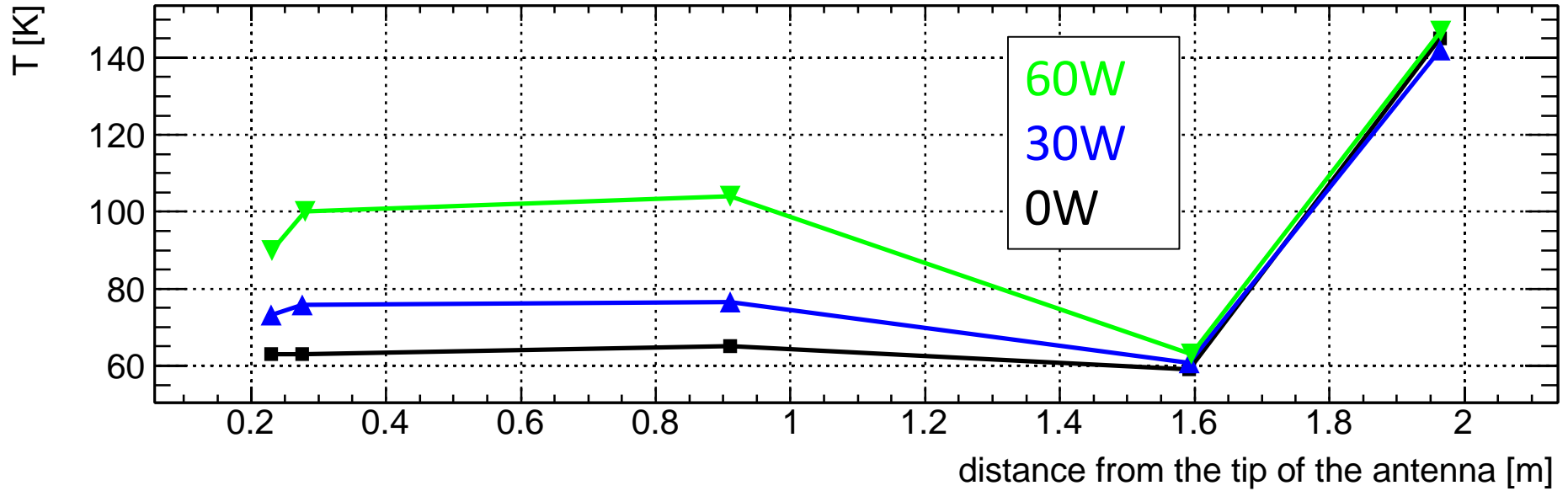


RF **short** preventing further cavity loading

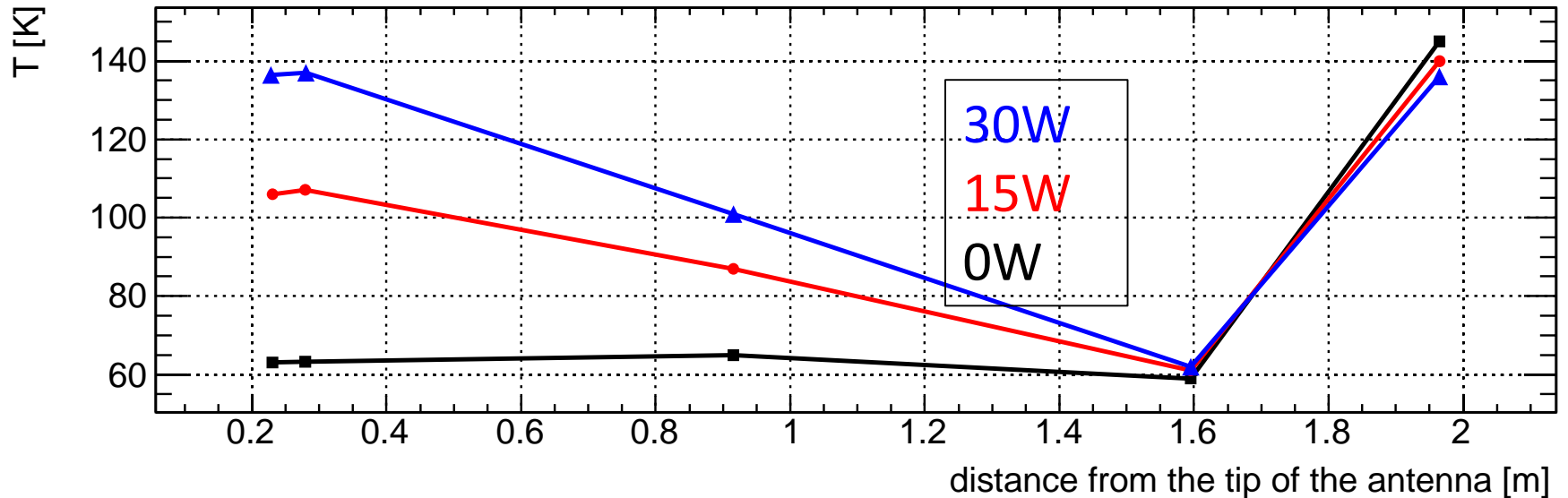


RF cable insulation melt and polymerized

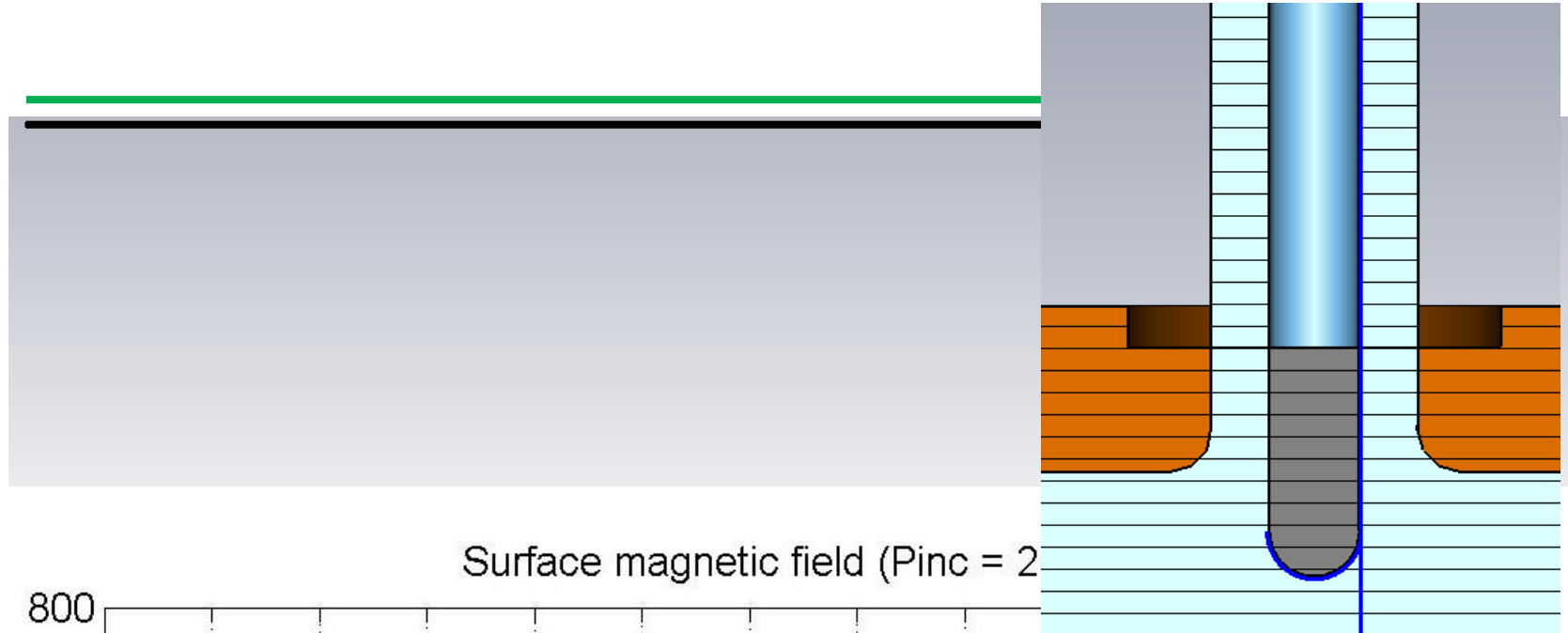
# Equilibrium T distribution: off resonance...



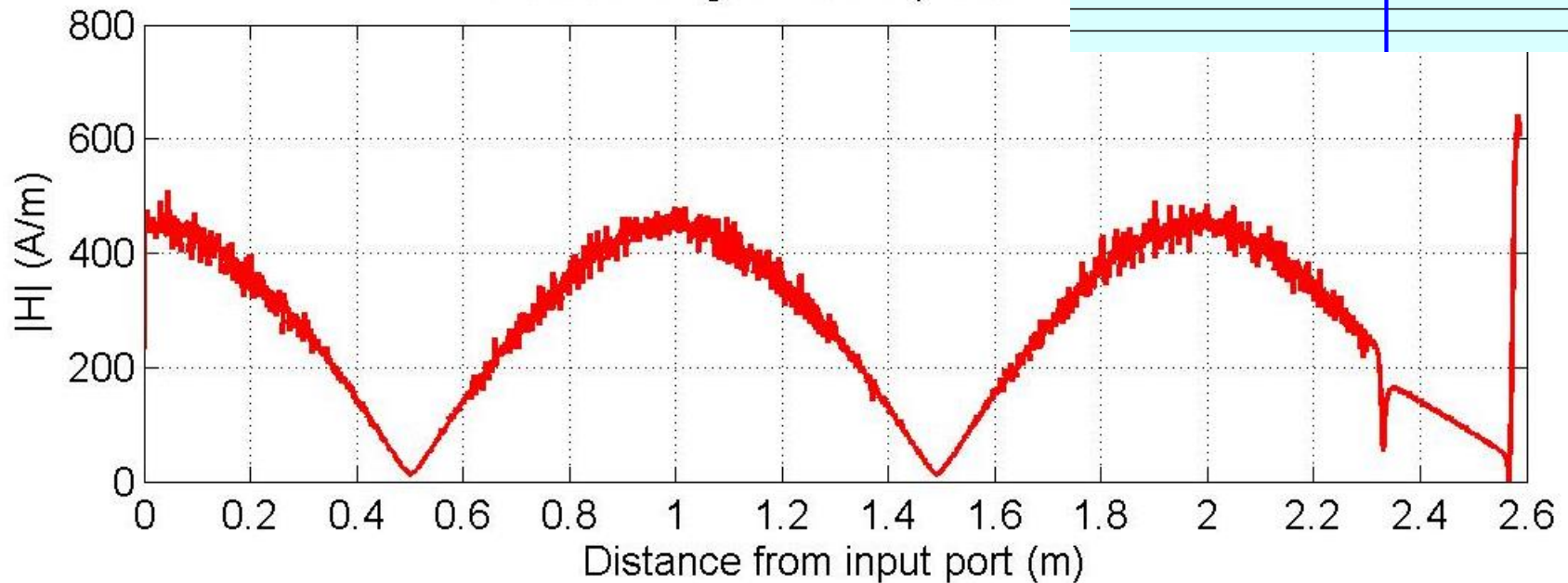
# ...on resonance



# Detailed RF simulation of H-field pattern

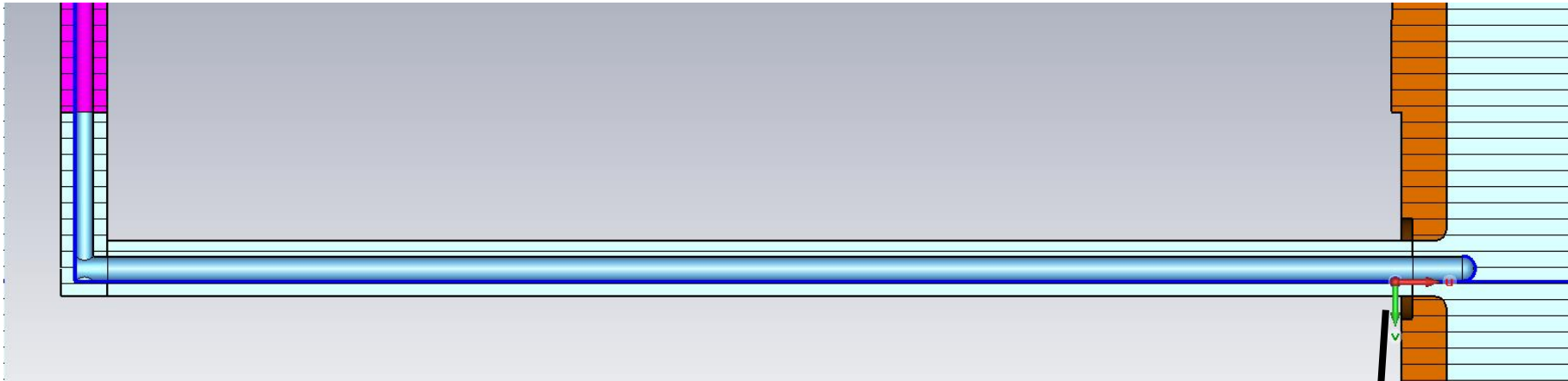


Surface magnetic field (Pinc = 2

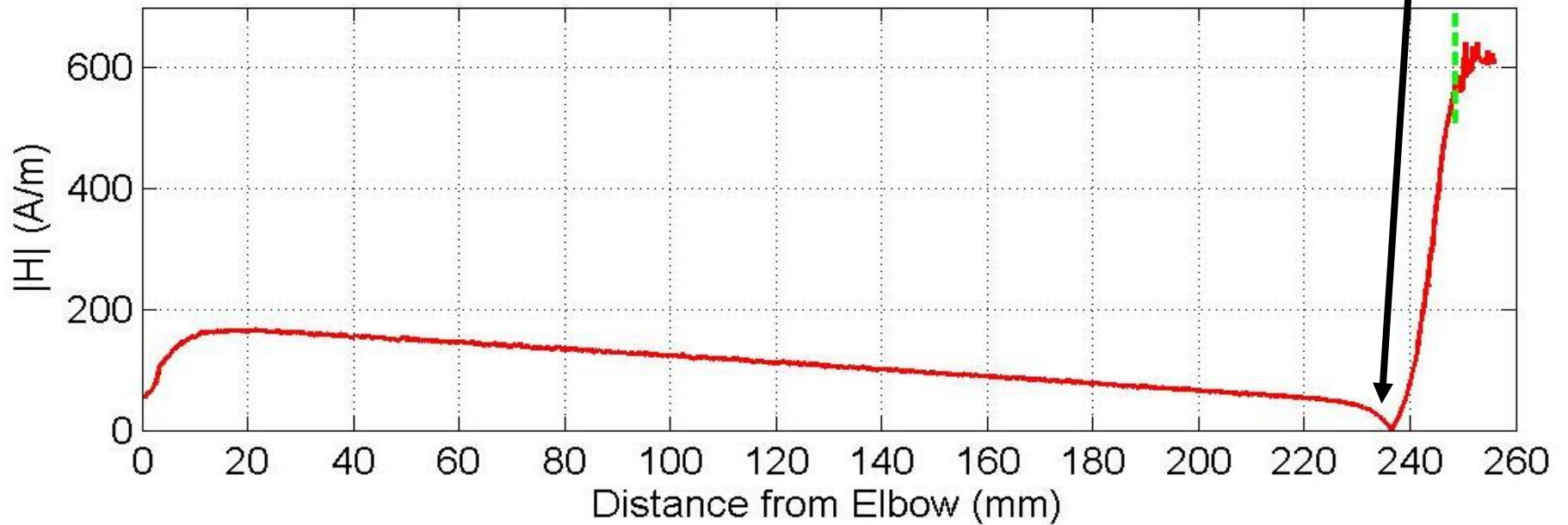




# Surface H field (inner conductor)



Surface magnetic field ( $P_{inc} = 250W$ )



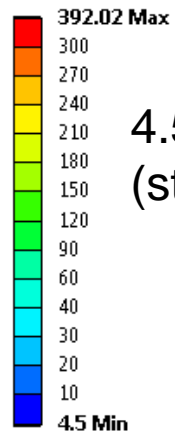


# Task force conclusions

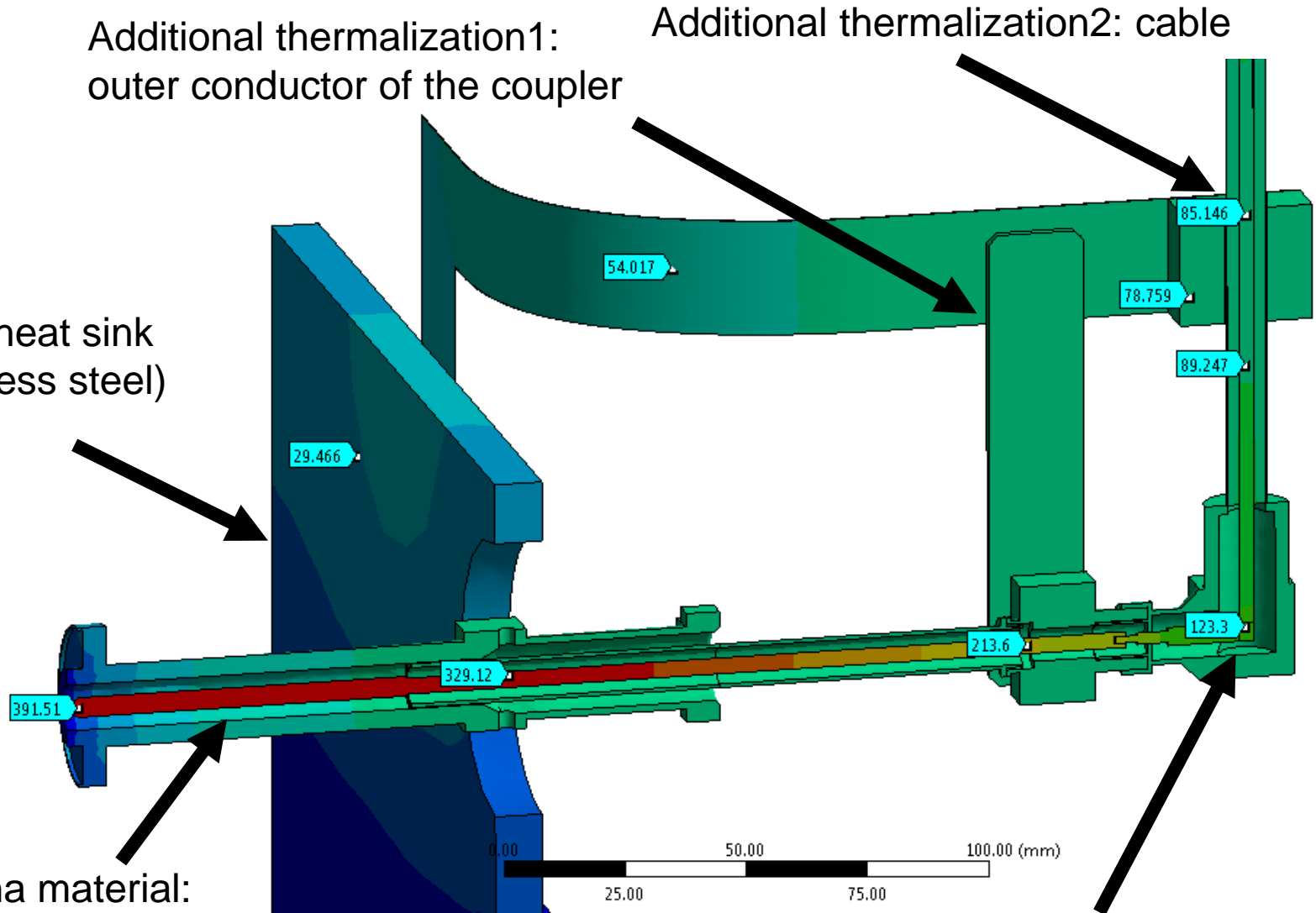
- The triggering phenomenon is pure RF heating
- Glow discharge, if present, due to consequent outgassing
- Key is cooling of the coupler antenna
- **New thermalization of copper and cable**
- **Change antenna material, weld antenna to cable**

# Modifications to the coupler system

D: Copy of big sheets  
Temperature  
Type: Temperature  
Unit: K  
Time: 1  
12/11/2015 09:11



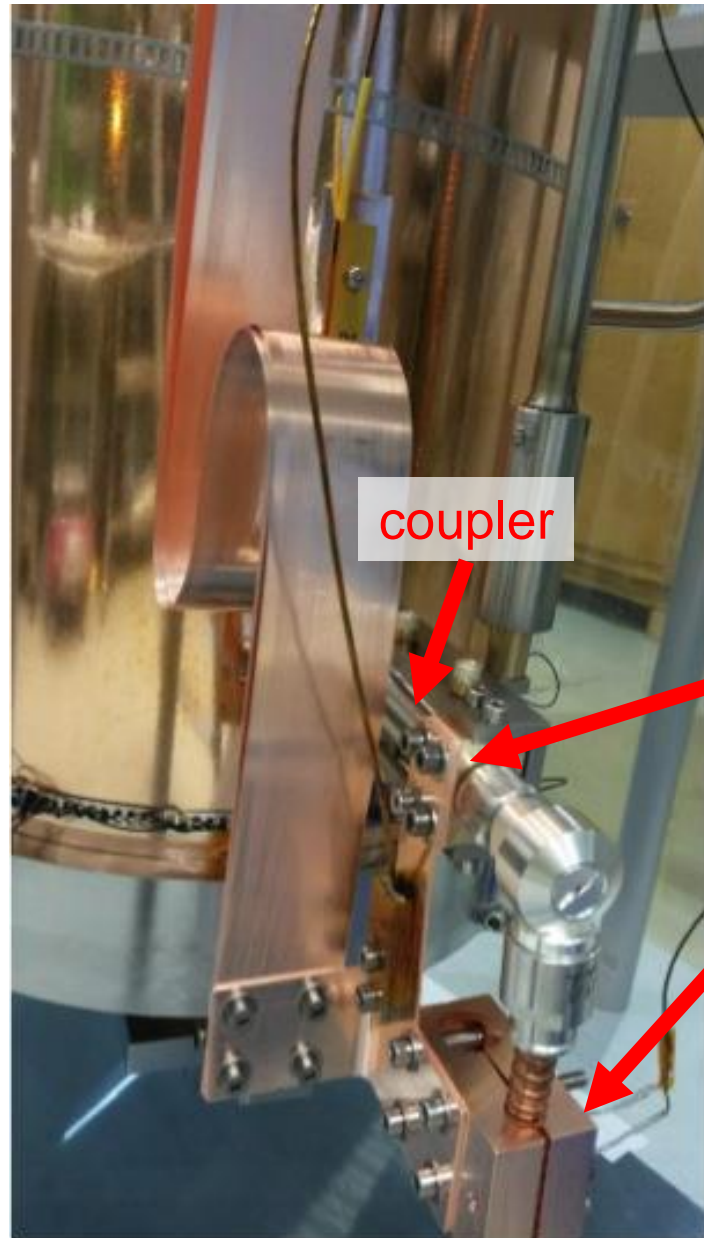
4.5 K heat sink  
(stainless steel)



New antenna material:  
Cu OFE

Brazed contact between the antenna and the inner conductor of the RF cable

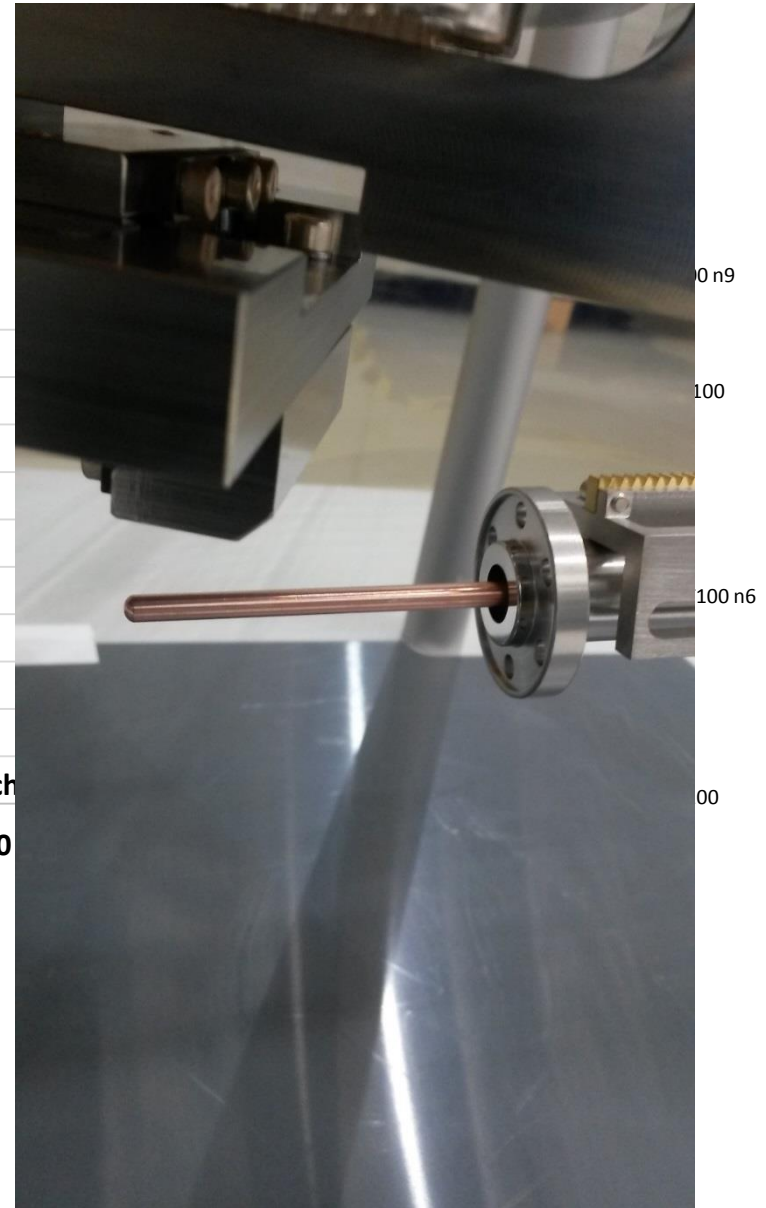
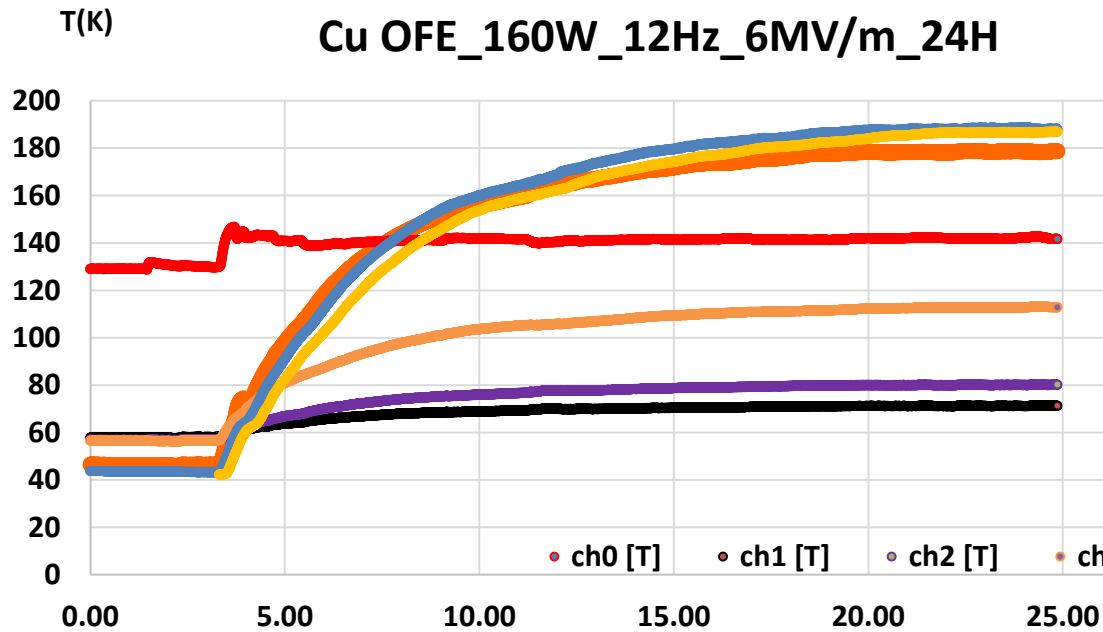
# Validation test in SM18 (December 2015)



additional  
thermalization

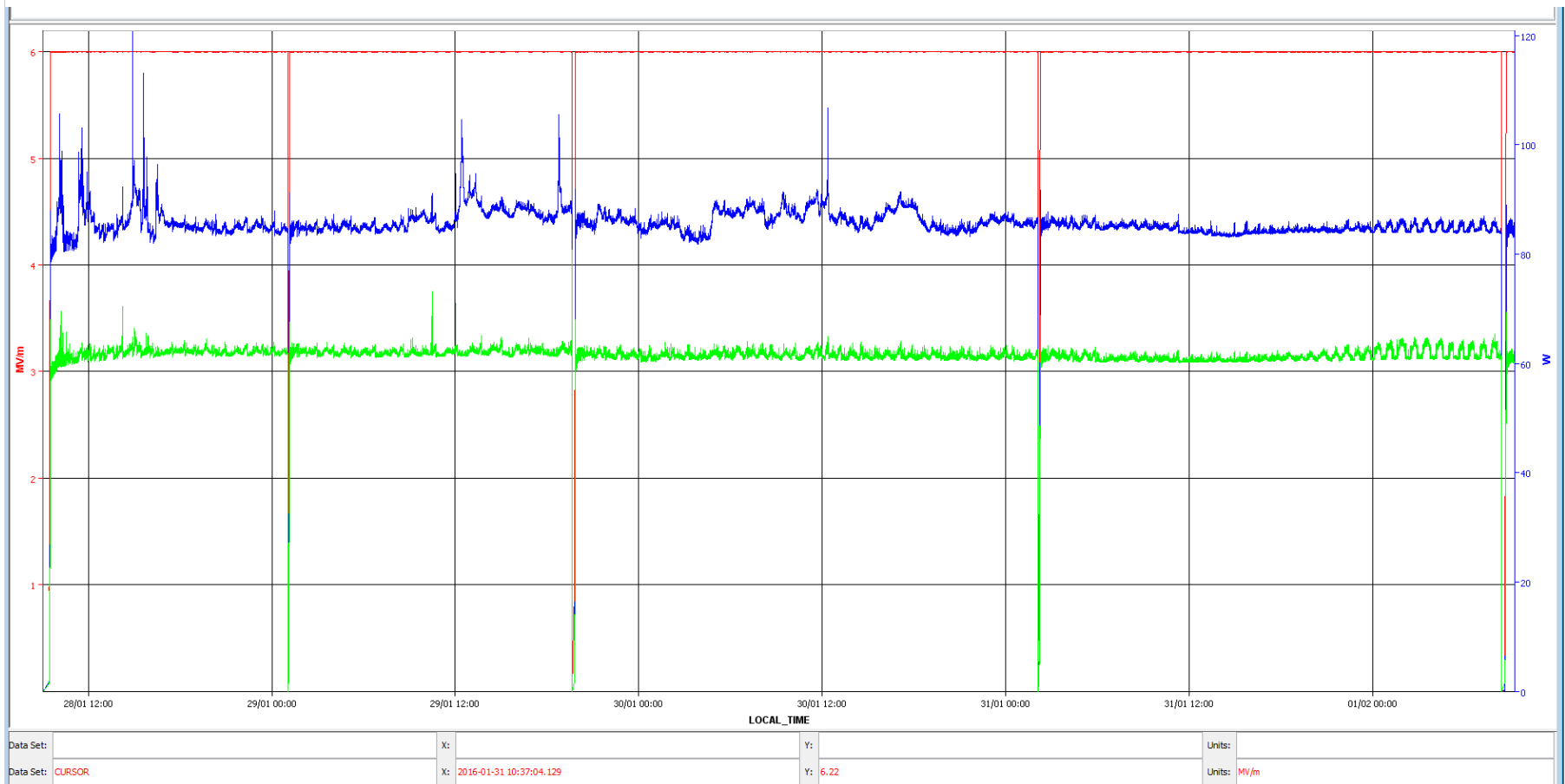
# Results of first heat run (December 2015)

$P_f = 160\text{W}$  (170W), 12Hz, 6MV/m, 24H



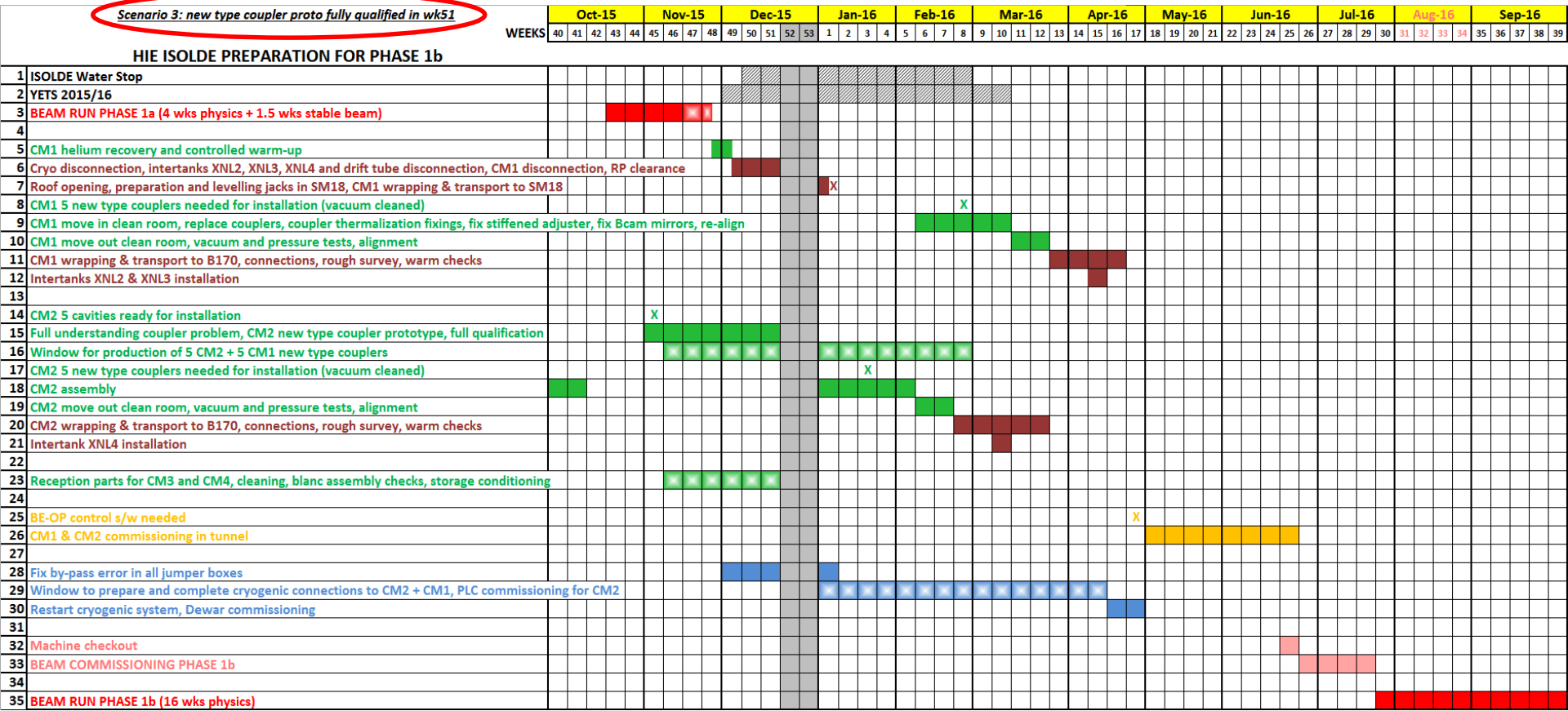
# Heat run with LLRF loops closed (Jan 2016)

4 days at 6 MV/m with amplitude and phase controlled,  
and ~ 90 W forward power



# Planning end-of-year & shutdown

F. Formenti



Based on having a new type of coupler fully qualified by WK51

# Roadmap (shown at the previous ISCC): update

- Design & procurement of parts for CM2 and CM1
- Uninstall CM1 before Christmas
- Full validation in SM18 of coupler solution
- Install cavities and ancillaries in CM2
- As possible, condition parts for CM3
- Finalize cryogenics work
- Cavities for CM3: finalize actions at CERN and unblock RI
- Ship CM2 to ISOLDE, retrofit CM1
- Ship CM1 to ISOLDE
- Recommissioning of CM1+CM2
- Goal: start physics at 5.5 MeV/u (Phase1) in Summer 2016