

Summary of Experimental Work in EuCARD-2 Task 12.4

Objectives:

- “Measure HOMs of the XFEL 3rd harmonic RF cryomodule”
 - Measured spectra in individual cavities, in chain of 8 cavities at room temperature and in superconducting state (P1-P2)
- “Design HOM-based electronics for beam diagnostics”
 - Initial proposal only! (design made, see below)

Description of work:

- “[...] electronics [...] is also planned for the cavities at the XFEL. [...] The electronics is required to adhere to the XFEL standard”
 - Design of electronics for XFEL 1.3 and 3.9GHz cavities (P1-P3); prototypes should be ready for tests in several months

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Description of work (cont.):

- “the possibility to accurately measure the beam phase with respect to the RF phase [...] will be assessed”
 - Simulations with circuit model (P2-P3)
 - Measurements with scope-based setup at FLASH and the E-XFEL
- “[...] the cavities [...] positioning within each module...”
 - Measurement of cavity offset within cryo-module (P3)
 - Minimized HOM-power; also attempt to measure cavity tilt
 - Participation of Micha Dehler (task 12.3)
 - Beyond scope of our task
- “Studies on the 1.3 GHz accelerating cavities within XFEL will also be conducted”
 - Demonstrated stability of HOM-based position monitoring (P1-P2)



Reserve slide:

Minimization of HOM Power in one Cavity

- Minimized power of 1.7GHz HOM in cavity under study
 - Used OCELOT-code (Sergey Tomin et al.) to find center of cavity as starting point for angle scans
- Scenarios for reduction of HOM effects
 - Minimize HOM power in two cavities, at beginning and end of module
 - Minimize HOM power sum of all 8 cavities (also for 3.9 GHz cryo-module)

