

Task 4 description



Task 4: Simulation of irradiation effects and mitigation methods (A. Lechner – CERN)

- Simulations on the degradation due to irradiation, ions (with ion tracks) and protons bombardment.
- Understand effect of time of energy deposition on damage and property degradation, taking into account dose rate and dynamical annealing effects for high intensity beams.
- Include effects of nuclear transmutations and gas production.

Participants: CERN, GSI, POLIMI

This task will contribute as well to an extra European collaboration ([RaDIATE - Radiation Damage In Accelerator Target Environment](#)), aimed at understanding the effects of radiation on material

1 Feb 2017



Task 4



- Quantify DPA, gas production for complex radiation environments (e.g. LHC collimators/absorbers, FCC collimators/dump) and provide a relationship with (previous/future) radiation experiments
 - Expertise and tools available at CERN
 - Not only peak values, but also spatial extend of radiation damage (radiation fields in accelerators can exhibit strong gradients)
- Evidently, a key point would be to relate radiation damage quantities (like DPA) with the change of relevant macroscopic material properties
 - Requires input from experimental studies (strongly relies on collaboration with other tasks/other collaborations)

Deliverables



- Task 17.2) Comparative compendium of the developed materials [month 40]
- **Task 17.4) Report on simulations on irradiation effects [month 44]**
- Task 17.3) Irradiation test results: Beam impact on new material and composite [month 48]
- Task 1.4) Production of material samples (as large as possible for each industry to demonstrate workability) [month 24]



Milestones



- Task 17.1) Organisation of PowerMat kick-off meeting, with publication of talks on Web [month 6]
- Task 17.2) Material characterisation, with publication of results on Web [month 18-24]
- Task 17.3) Irradiation, with publication of report on web[month 27]
- **Task 17.4) Irradiation effects analysis, with publication of report on web[month 36]**
- Task 17.5) Report on studies, with publication of report on web, [month 46]
- Task 1.4) Prepare first samples [month 12]

