



Contribution ID: 61

Type: Oral

Girder Transport Deformation Testing for Petra IV

The PETRA IV project has stringent $30\ \mu\text{m}$ requirements on total magnet-to-magnet on-girder alignment accuracy, which includes the total effects of girder transport deformations, magnetic axis determination, fiducialization, measurement imprecisions, and various other effects. Transportation of girders is a critical part of the installation and integration of the PETRA IV project, therefore reliable preservation of girder's alignment with minimal deformation during transportation must be demonstrated. This information is necessary to create the logistics and installation plans for the whole PETRA IV project.

Here we describe the campaign of measurements conducted to determine transportation deformations, including the custom measurement apparatus, model and analysis, transport tests, and results. A specialized experimental setup was developed to determine the size of deformations during the transportation of the fully assembled girders. Based on repeated measurements of a stationary and temperature-controlled girder, the 1σ accuracy of the experimental apparatus is observed to be within $5\ \mu\text{m}$ for virtual beamline points. A Gauss-Markov model was developed in-house to analyze the measurements that include interferometric measurements taken by a laser tracker. After 12 epochs of transportation by crane and truck, no total deformation of virtual beam points is observed to within experimental accuracy, and the maximum apparent deformation of virtual beam points was $8.2\ \mu\text{m}$.

Author: BARKER, Jana (DESY)

Co-author: SCHLÖSSER, Markus (DESY)

Presenter: BARKER, Jana (DESY)

Session Classification: Session 3 - Metrology I

Track Classification: Metrology