

Metallurgical aspects of the ET beampipe design

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Laser beams of the Einstein Telescope (ET) are currently planned to be contained in a 120 km-long 1 m-diameter ultra-high vacuum pipeline, which intends to become the largest ultra-high vacuum system ever built. Traditionally, austenitic stainless steel is used for such pipelines, but given the scale of the project, alternative materials must be considered to reduce the cost. Ferritic stainless steel (FSS) is a good alternative but presents challenges when it comes to welding. An overview of a joint research program between Ghent University and CERN is presented in this contribution. The work included modelling of weld heating cycles, microstructure characterization, and failure analysis. Microstructural features and their effects on the weld zone formability in several FSS grades are discussed, and preliminary conclusions concerning FSS applicability in the ET project are drawn.

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