



Contribution ID: 22

Type: **Talk**

ET Coating R&D @ UniSA/UniSannio

Friday, 12 April 2019 10:10 (20 minutes)

The University of Sannio and the University of Salerno joined forces to develop advanced optical coatings for 3G gravitational wave detectors.

We own a fully programmable plasma-assisted e-beam optical-coating deposition system with sub-nm accuracy/repeatability, using up to 6 different materials in a single batch, and state-of-the-art thin-film characterization facilities including AFM, STM, XRD, SEM and TEM.

Identifying cryo-compatible high and low index optical materials (free from the well known blow-up of mechanical losses at cryo-temperatures observed in the materials used in 2G detectors) is a key problem for ET. Recent results, obtained in collaboration with NTHU, demonstrated that nanolayered composites made by a glassy but not cryo-friendly material like Silica, and a cryo-friendly material but prone to crystallization upon annealing like Titania tolerate very high post-deposition annealing temperatures without crystallizing, and do not exhibit a cryogenic mechanical-loss peak.

In the light of these results, nanolayered Silica/Alumina composites are suggested as an excellent candidate low-index ($n \sim 1.6$) cryo-friendly coating material for ET, possibly better than currently candidate Silica-doped Hafnia ($n \sim 1.8$).

The expected performance of a whole 5ppm transmittance coating based on a-Si and nanolayered $\text{SiO}_2::\text{Al}_2\text{O}_3$ will be illustrated together with our deposition and testing plans for the next months.

Primary authors: Prof. BOBBA, F.; CARAPPELLA, G.; CHIADINI, F.; DI GIORGIO, C.; DURANTE, O.; FITTIPALDI, R.; FIUMARA, V.; NEILSON, D.J.; PIERRO, V.; PINTO, I.M.; PRINCIPE, M.

Presenter: DI GIORGIO, C.

Session Classification: ET technology

Track Classification: ET technology