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Composite silicon optics for next generation ground based GW detectors

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The success of the next generation of ground based GW detectors will require large diameter test mass optics that can be operated at cryogenic temperatures. Silicon test masses of >45cm diameter, and 100-200kg are the leading contenders for mirror substrate material, however currently there is no one who can provide silicon of the required high quality and large diameter that is needed. Researchers at the IKZ (Leibniz Institut für Kristallzüchtung), the DZA (Deutsches Zentrum für Astrophysik) and at the IGR (Institute for Gravitational Research) are working together to come up with a design for a composite test mass, which will bond together high quality float zone silicon to attain a composite test mass for installation into 3G detectors. This talk will discuss models of possible composite mass geometries, bonding approaches taken to attain a composite mass, and the optical characterisation measurements that are most important for this project.

Author: Dr HENNIG, Margot

Presenter: Dr HENNIG, Margot

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