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Stiff and Lightweight Optical Mirrors Made by Glass Slumping with Foamed Core

Category: 35. Instrumentation: Ground Based or Airborne

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At the Brera Astronomical Observatory (Milan-Italy) an innovative technique is under development aiming at permitting the manufacturing of high quality astronomical mirrors, with a drastic reduction of the mirror weight, cost, and production time. The method foresees two main steps: a) a thin mirror shell is produced using a hot slumping technique. A flat glass sheet having a thickness of few mm is placed onto a convex ceramic mould having a high optical quality. During a suitable thermal cycle the glass sheet will slump onto the mould and the glass will copy with high accuracy the shape of the mould. This step produces a thin and floppy concave glass shell having a good intrinsic optical shape. b) the curved shell (maintained in its intrinsic shape) is assembled and glued to a stiff substrate made in a foamed and pre-shaped material. To obtain a sandwich structure, on the back of the substrate it is also glued a flat sheet of the same glass. Due to this replica approach, the system could be in principle used for the mass production of identical mirrors for a number of applications, as e.g. faced large primary mirrors. This paper describes the process of production of a prototype optical segment and the status of the investigation.

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