## 962-01-22

Jan P Hogendijk\* (hogend@math.uu.nl), Department of Mathematics, University of Utrecht, P.O. Box 80.010, 3508 TA Utrecht, Netherlands. Concrete geometry in the medieval Islamic world: an instrument for finding the distance and direction of Mecca.

All Muslims must face Mecca in their daily prayers, so they must be able to find the qibla, that is, the direction of Mecca, at any locality in the world. In 1989, a brass instrument for this purpose, of a hitherto unknown type, showed up at Sotheby's in London, and in 1995 a similar instrument surfaced in an antique shop in Paris. A detailed description of these instruments was published, together with an analysis of their workings, by David King in 1999. He showed that they were probably manufactured in Isfahan (Iran) in the early 17th century. The instruments consist of a plate which displays a grid of parallels of longitude and latitude curves (ellipses), and a diametrical ruler with a sinusoidal scale, which rotates around the centre of the plate. In my talk I will (1) explain the mathematics of this ingenious instrument, (2) hopefully provide each participant with a model, and (3) argue that the instrument was invented as a natural generalization of a so-called analemma construction of the qibla by a number of medieval authors, including al-Biruni (972-1048). (Received June 09, 2000)