An important aspect to guarantee a stable and precise operation of any RICH detector is the alignment of the mirrors. The alignment itself has two aspects: the initial alignment during setup and a misalignment monitoring during operation. For the monitoring, methods have been established based on data or an independent control of the mirror positions. The CLAM method, developed by COMPASS [1] is an example of the latter and is tested for a future realization in the CBM-RICH. This article describes a test setup on a small scale that has been implemented in the RICH prototype and tested in beam during the RICH beamtime at CERN-PS in November 2014.

Figure 1: CLAM equipments used in the RICH prototype. Retro-reflective grid, with target dots (left). CLAM camera, surrounded by three LEDs (right).

Figure 2 shows two pictures taken for the aligned mirror system (left picture) and with misalignment by 2 mrad of the lower left mirror (right picture). Figure 3 illustrates ring reconstructions using these two setups. For the misaligned case an extreme example is shown with a B axis of the ellipse fit of 3.6; the average radius is 4.6.

A first qualitative look at mirror displacements can be given, when looking at the continuity of the reflected stripes. Indeed if a mirror is displaced with regard to one of its neighbors, stripes will appear broken at mirror edges (Fig. 2 right). Stripes are then cut into two shifted parts. According to the shift, it is possible to deduce the relative misalignment of mirrors [2].

A quantitative evaluation can also be made with this setup, when considering photogrammetry. From the relative positions of target centers to external marked reference points, the orientation of mirrors can be extracted [3]. This procedure will be implemented in a next step.

Currently the analysis of the beamtime data is ongoing and correction routines for the misalignment are in preparation.

References