Contribution ID: **53** Type: **not specified**

# An “adaptive cooling method”for X-ray wavefront preserving mirrors

In diffraction limited storage ring or free electron laser beamlines, the thermal deformation control of optical elements under concentrated heat loads is a key technology for wavefront preserving. To cover a photon energy range of 400eV to 1240eV, the beam footprint and flux density distribution on the mirrors will vary significantly when the photon energy changes. Which poses great challenges for the cooling system and thermal profile control methods. In this work we conducted researches on the design of mirror cooling mechanisms under varying thermal load distribution, and proposed a cooling mechanism that can achieve adaptive adjustment to match the cooling efficiency with the spatial thermal load distribution. Adopting segmented copper cooling blocks to achieve discrete adjustments of effective cooling length; Set up heat transfer efficiency adjustment holes at appropriate positions on the copper cooling block to adapt the local cooling efficiency according to the Gauss-distribution thermal load. The coolant flow rate regulation is also utilized to further achieve continuous adjustment of working modes. This method can control the thermal profile of the grazing optics under the thermal load condition of 100kHz high repetition frequency in the entire wavelength range of 1-3nm, providing the optical accuracy with a height error RMS 1nm or less, and a slope error RMS within 50nrad.

## I plan to submit also conference proceedings

Yes

**Primary author:** LIU, jiayin (Institute of advanced science and facilities, Shenzhen)

**Co-authors:** Mr QIN, hongliang (Institute of advanced science and facilities, Shenzhen); Mr HUANG, zhifeng (Institute of advanced science and facilities, Shenzhen); Mr XU, zhongmin (Institute of advanced science and facilities, Shenzhen)

**Presenter:** LIU, jiayin (Institute of advanced science and facilities, Shenzhen)

**Session Classification:** Mikrosymposium MS 11/1: SR facilites: Updates and New Facilities