

Iris Mechanism

Low-friction, UHV-compatible iris diaphragm with continuously adjustable central aperture

Reference no. P 170

BACKGROUND

In particle accelerators, various effects produce undesired radiation that surrounds the particle beam. This undesired radiation can be reduced using an adjustable aperture. However, known adjustable slit- or aperture-mechanisms cannot easily be used at any position in accelerator facilities. Limited installation space and extreme environmental conditions are demanding special design requirements. E.g. ultra-high-vacuum ($p < 5 \cdot 10^{-10}$ mbar) requires a complete absence of lubricants. Furthermore, lowest outgassing and temperature resistance of up to 250°C as well as radiation resistance for all materials used is mandatory.

SOLUTION

A novel iris mechanism has been developed for these requirements and extreme conditions of use. Unlike conventional iris mechanisms, which contain several sliding guides, the new mechanism is based on only one hybrid roller bearing and several elastic flexures. The mechanism is therefore suitable for applications in which sliding friction must be avoided.

ADVANTAGES

- Space-saving design
- Continuously adjustable aperture driven by only one single drive
- Usable in environments where low particle generation is needed
- Usable in extreme ambient conditions, e.g. high radiation levels, UHV, absence of lubricants, etc.

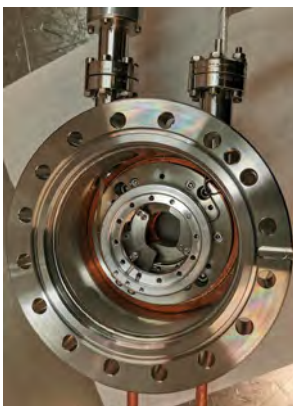


Fig. 1: Collimator with unilaterally cooled blades driven by one linear actuator, overall view from drive side in open position (Credit: Frieder Müller).



Fig. 2: Collimator with unilaterally cooled blades driven by one linear actuator, arrangement with a small aperture (2 of 4 blades visible) (Credit: Frieder Müller).

FIELDS OF APPLICATION

- Continuously variable aperture / collimator in ultra-high vacuum
- Adjustable aperture in particle accelerator facilities at high ionizing radiation dose rate (research & radiotherapy)
- Stray light aperture in photon beam applications
- Aperture in clean room applications (semiconductor exposure)
- Gripper mechanism in which a rotational movement is converted into a clamping or locking movement. (robotics)
- Versatile form-locked joint
- Use under extreme ambient conditions (aeronautics / space)

PROPERTY RIGHTS

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POSSIBILITIES FOR COLLABORATION

- Licensing
- R&D cooperation

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