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## Electron source uniformly distributed in the plane for MCP electron scrubbing and testing

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In order to realize electron scrubbing and subsequent testing for microchannel plate (MCP), several electron sources uniformly distributed in the plane are developed.

The first solution is that the electron gun designed into tray shaped filament structure is installed in the proper location within the shielded metal cylinder. A metal mesh is located in the electron emitting end and a focusing electrode is laid on the front end. The performance of electron gun is adjusted by changing the filament heating current, shielding cylinder and the focusing electrode voltage. The second is using deep ultraviolet excitation gold photocathode to produce electron source uniformly distributed, wherein the light source may be a low pressure mercury lamp or a deep ultraviolet light emitting diode (DUV LED). The former is adopted by tray shaped low pressure mercury lamp, and many rotatable grids and diaphragm are orderly arranged in the outlet section. On the basis of changing the number of grid and their direction, one can adjust the intensity of ultraviolet light, which controls the beam current density. And the electron beam spot size is determined by the diaphragm diameter. The latter uses the DUV LED array as the light source, the uniformity of the beam current and the light output intensity are determined by designing the arrangement of the LED array and driving current of the LED, respectively. The third, of course, is use deep ultraviolet light directly irradiating onto the MCP input surface which is covered with Au film. By changing the DUV light intensity and the voltage of MCP, the regulation of a large range beam current is realized. Through the comparison of advantages and disadvantages of uniformly distributed electron sources with the different structures, one can obtain better production according to different use requirements.

Key words: uniformly distributed electron source, deep UV light, microchannel plate, electron beam current

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