

photomultiplier tube

A *vacuum phototube* with additional amplification by electron multiplication. It consists of a photocathode, a series of dynodes, called a dynode chain on which a secondary-electron multiplication process occurs, and an anode. According to the desired *response time*, transit time, time spread, gain, or low *dark current*, different types of dynode structures have been developed, e.g. circular cage structure, linear focused structure, venetian blind structure, box and grid structure. Some special dynode structures permit combination with additional electric or magnetic fields.

A strip dynode photomultiplier tube consists of a photocathode followed by thin dynode material on an insulating substrate. In a continuous-strip photomultiplier, two strip dynodes are arranged in parallel. A potential applied to the ends of the two strips produces an electric field across the continuous strip dynodes, giving rise to electron multiplication along the dynodes. In a resistance-strip magnetic photomultiplier, a uniform magnetic field is applied to the planes of the strips, so that the electrons travel in the crossed electric and magnetic fields.

A channel photomultiplier tube photocathode consists of a channel electron multiplier (CEM) system for the photoelectrons, and an anode to collect the final electron current. The basic part of the CEM is a tube with a semiconducting inner surface. In general it is curved in order to inhibit the acceleration of positive ions towards the photocathode. A number of small channels called microchannels can be constructed in arrays for imaging applications.

1995, 67, 1753; see also 1982, 54, 1548