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**Further Developments and Beam Tests of the Gas
Electron Multiplier (GEM)**

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We describe the development and operation of the Gas Electron Multiplier, a thin insulating foil metallized on both sides and perforated by a regular pattern of small holes. The mesh is incorporated in the gas volume of an active detector to provide, after application of a difference of potential between electrodes, a first amplification channel for electrons. We report on the basic properties of GEMs manufactured in different geometries and operated in several gas mixtures as well as, if coupled to a high rate device, on their long-term stability after accumulation of charge equivalent to several years of operation in the future high luminosity experiments. Optimized GEMs reach gains over 2000 at comfortable operating voltages, permitting the detection of ionizing tracks without other amplifying elements but on a cheap, simple printed circuit board (PC), opening new possibilities for detector design. We have also evaluated the detection efficiency, time and spatial resolution of GEMs coupled to Micro Strip gas Chambers or PC boards in particle beams in presence of a strong magnetic field.