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### **Development and Applications of the Gas Electron Multiplier**

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Detectors based on the Gas Electron Multiplier (GEM), introduced a few years ago, have excellent high rate capabilities and are used for fast tracking in several HEP experiments. After a brief general introduction on gaseous micro-pattern devices, I will describe the major operating characteristics of GEM-based detectors, and provide examples of implementation and performances in running and proposed experiments. Novel developments include the use of GEMs as end-cap detectors in Time Projection Chambers for the Linear Collider and for a Hadron-Blind detector at BNL. Coating the first GEM in a cascade with a photosensitive layer permits to detect and localize single photons; recent developments in view of applications in Cherenkov Ring Counters will be described. The excellent micro-pattern imaging characteristics are exploited for neutron detection and for measurement of X-ray polarization in astrophysics. Operation in cryogenic conditions has also been demonstrated, opening the way to new possibilities in detection of WIMPs and dark matter.