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Progresses in the production of large-size THGEM boards

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The THicK GEM (THGEM) electron multipliers are derived from the GEM design, by scaling the geometrical parameters and changing the production technology: THGEMs are PCBs produced by etching and drilling. THGEMs can be produced in large series and large size at moderate cost with standard PCB technology, in spite of the large number of holes: some millions per square meter. Small-size (a few cm2) detectors exhibit superb performance, while larger ones exhibit gain and response uniformity limitations. The difficulty of reproducing with larger detectors the results obtained with the small ones are strictly related to production aspects. The typical industrial requirements and quality control adequate for PCB dedicated to electronics application, are not satisfactory for THGEMs. We have studied with a systematic approach several aspects concerning the material (type and thickness of the fiberglass plates) and the production procedure, in particular the cleaning and polishing stages. The net result is the production of large THGEM multipliers reproducing the performance of the small ones. We report in detail about the studies and the results.

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