Large Area Photodetectors Based on Micropattern Gas Sensors

We are developing photosensors based on transparent photocathodes in close proximity (~0.2 mm) to a high field gas amplifying structure (Micromegas or Micro-Bulk). Such a device, sometimes called "Gas-PMT" has been discussed as an option with very low magnetic field sensitivity (see eg. Sumiyoshi et al).

The close proximity of the amplification region to the photocathode reduces sensitivity to external fields. The same feature also lends such a structure to fast timing applications since the diffusion limited single photoelectron time jitter can be as small as ~30 picoseconds.

Our research has focused on photosensors for charged particle timing from Cerenkov light produced in the entrance window. We also foresee a broader application where fast, large area, thin (~0.25 mm) photosensors would be applicable.

Among the emerging areas are in photon sciences (particularly at FELs), underground experiments, optical TPC and the HL-LHC detector upgrades.