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Would MPGDs revolutionize noble-liquid detectors?

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Some novel ideas of ionization-electron and scintillation-photon sensing concepts in single-phase noble-liquid detectors are presented. They rely on immersed micro-structured electrodes, including ones undercoated with VUV photocathodes. Both, radiation-induced electrons from the liquid and primary-scintillation photoelectrons emitted by the photocathode are collected on thin anode strips or micro-patterned surfaces. This results in combined electroluminescence and small charge multiplication in the liquid. The resulting fast UV-photon flashes are detected by near-by photosensors, e.g. SiPM or CMOS arrays, above their dark noise. Some of the proposed concepts permit conceiving single-phase detectors of various geometries. They are expected resolving current liquid-to-gas interface issues in large-area dual-phase detectors e.g. in future dark-matter searches, neutrino experiments and in other fields.

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