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Measurements of the density of metastable helium atoms in dielectric barrier discharges ALI EL-ASTAL, Department of Physics,Al-Aqsa University,Gaza P.O. Box 4051,Gaza Strip, The Palestinian Authority, GAGIK NERSISYAN, TOM MORROW, WILLIAM GRAHAM, Physics and Astronomy, Queens University Belfast, BT7 1NN, Northern Ireland — Measurements of the density of metastable helium atoms in dielectric barrier discharges operating in glow discharge mode are reported. The measurements were made in two systems using three different approaches. One DBD was created in air with helium flowing in the inter-electrode gap, in the other the DBD was in a vacuum chamber in static pure helium with some impurities present. In the first system a multi-pass absorption technique at 388.865 nm was used, the lack of any absorption signal over a path length of 25 cm indicated an upper limit of the metastable density in this system of $2x10^{10}$ cm^{-3}[1]. In the second system the time dependence of the helium metastable density using laser collisional-induced fluorescence established that the maximum density in this system was in the range 0.5 to 2.5 $x10^{10}$ cm^{-3} and from the time dependence the metastable density at the next breakdown was estimated to be about 10^4. When the glass plates in the latter system were replaced by optical quality quartz, helium metastable absorption can be seen as an optogalvanic effect on the measured discharge current, indicating a higher metastable density in this case. [1]G Nersisyan, T Morrow, WG Graham Appl. Phys. Lett. **85**, 1487 (2004).

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