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Possible density diagnostic by collisional depolarization in planetary atmospheres

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The polarization under study is linear and results from an anisotropic mechanism of line formation, which creates differential Zeeman sublevel populations. The isotropic collisions with the surrounding particles tend to reduce the difference, so that the line polarization depends on their density. The density diagnostic should then be possible within a certain range of sensitivity. This possibility will be discussed in two particular cases: 1/ the impact polarization of the O I 630.0 nm line of Earth Aurorae. The theoretical value of this polarization has been recently published (Bommier et al., 2011, Ann. Geophys. 29, 71), but it is noticeably larger than the observed polarization. A density diagnostic is then to be expected by depolarization. 2/ the scattering polarization of Na I D2, observed with the ground-based spectropolarimeter THEMIS in Mercury's exosphere (A. Lopez Ariste, this meeting). Again, the observed polarization is noticeably weaker than the theoretical one computed in a collisionless scheme with the code of Bommier (1980, A&A 87, 109). Moreover, the phase angle behavior of the observed polarization is well reproduced with the code of Kerkeni& Bommier (2002, A&A 394, 707) that incorporates collisions to the model, but not with the expected collider of Mercury's exosphere. Perspectives will be drawn.