Measurement of the dependence of the electron density profile on the electron temperature profile and on the tokamak safety factor profile

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Experiments were performed to determine the dependence of the tokamak electron density profile on the electron temperature profile and the magnetic shear or safety factor profile (also known as the q-profile). In tokamak plasmas with low or moderate particle sources, the shape of the density profile is determined by a balance of outward diffusive and inward convective terms. If the inward convective term depends upon the electron temperature profile then the shape of the density profile will depend upon the electron temperature profile. If the inward convective term depends upon the magnetic shear or q-profile then the shape of the density profile will depend upon the magnetic shear. For the low confinement mode discharges studied here, the density profile depends mainly upon the q-profile. This is determined in part by changing the temperature profile while keeping the q-profile unchanged and by changing the q-profile while keeping the temperature profile unchanged.