Free Boundary Minimal and CMC Annuli in the Ball

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We will present a family of free boundary minimal annuli immersed in the unit ball of Euclidean 3-space, the first such examples other than the critical catenoid. Their existence answers in the negative a problem of the theory that dates back to Nitsche in 1985, who claimed that such annuli could not exist. We will also construct embedded free boundary CMC annuli and embedded capillary minimal annuli in the unit ball that are not rotational. The existence of these embedded annuli is seemingly unexpected, and solves a problem by Wente (1995). Joint work with Mira-Hauswirth (for the minimal case) and Cerezo-Mira (for the CMC case).