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Axial plasma detachment in helicon plasmas during a global transition due to spontaneous self organization: instabilities, bifurcation and the helicon core formation. SAIKAT CHAKRABORTY THAKUR, RONGJIE HONG, GEORGE TYNAN, Univ of California - San Diego — We observe axial plasma detachment in a helicon plasma device that occurs simultaneously along with a spontaneous, self-organized global transition in the plasma dynamics via a transport bifurcation with strong hysteresis, at a certain B_crit [1]. For B <B_crit, the plasma is dominated by density gradient driven resistive drift waves. For B >B_crit, the plasma exhibits steepened density and ion temperature gradients, strong shearing in the azimuthal and parallel velocities, and multiple, simultaneously present, radially separated plasma instabilities. The axial detachment also follows the same hysteresis curves associated with the transport bifurcation that led to the transition. The value of B_crit depends on the source parameters (pressure, gas flow rate, rf power etc.). This study allows access to new regimes to study plasma turbulence and transport as well as plasma detachment and helicon core formation. We find that the plasma can exist in more than one type of helicon modes. [1] L. Cui *et. al.*, *PoP* **23** 055704 (2016).

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