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**Experimental and theoretical description of higher order periods in cardiac tissue action potential duration** CONNER HERNDON, FLAVIO FENTON, ILIJA UZELAC, Georgia Tech — Much theoretical, experimental, and clinical research has been devoted to investigating the initiation of cardiac arrhythmias by alternans, the first period doubling bifurcation in the duration of cardiac action potentials. Although period doubling above alternans has been shown to exist in many mammalian hearts, little is understood about their emergence or behavior. There currently exists no physiologically correct theory or model that adequately describes and predicts their emergence in stimulated tissue. In this talk we present experimental data of period 2, 4, and 8 dynamics and a mathematical model that describes these bifurcations. This model extends current cell models through the addition of memory and includes spatiotemporal nonlinearities arising from cellular coupling by tissue heterogeneity.

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