1125-VP-1408 **Barbara Margolius*** (b.margolius@csuohio.edu), Department of Mathematics, RT 15th floor, 2121 Euclid Blvd., Cleveland, OH 44115-2214. *Stable Quasi-Birth-Death Processes with Time-varying Periodic Transition Rates are Asymptotically Geometric.* Preliminary report.

Random processes with time-varying periodic transition rates occur in many natural and man-made systems. These include the level of water in the Great Lakes, the number of airplanes arriving to or departing from an airport, the volume of traffic on a city street, internet usage levels, demands for emergency service such as police fire or emergency medical, the volume of calls to a telephone call center, and many more. In this talk we outline an approach for obtaining asymptotic estimates of level probabilities of continuous time Quasi-Birth-Death process with periodic transition rates that can be used to model the aforementioned processes. We illustrate the method with the single server queue and then explore a simple Quasi-Birth-Death process example. The approach involves finding the roots of the determinant of a matrix related to the generating function for a two-dimensional random walk over a single time period. The level probabilities as the level number tends to infinity tend to periodic functions of the form $r^n f(t)$ where n is the level number, $f(t)$ is a function of time within the period and r does not depend on time. In other words, the level distribution is asymptotically geometric. The rate, r, does not depend on time. (Received September 16, 2016)