1154-46-757 **Ian Charlesworth** and **Brent Nelson*** (brent@math.msu.edu). *Free Stein Irregularity and Dimension.*

Given an n-tuple X of non-commutative random variables, its free Stein discrepancy relative to the semicircle law (the non-commutative analogue of classical Stein discrepancy relative to the Gaussian distribution) measures how "close" the distribution of X is to the semicircle law. By considering free Stein discrepancies relative to a broader class of laws, one can define a quantity called the free Stein irregularity. I will discuss this quantity and show how it can be related to other free probabilistic quantities such as the free Fisher information and the non-microstates free entropy dimension. I will also show how it can be easily computed for a number of interesting examples. (Received September 10, 2019)