Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Revision of Some Mathematical Descriptions of Nuclear Phenomena Needed To Account for Newly Discovered Nuclear MotionsD STEWART BREKKE, Northeastern Illinois Univ — Nuclear motion, especially vibration discovered about 1960, may alter some previous mathematical descriptions of nuclear phenomena. Thus, a nucleus when created may exhibit no motion, linear, rotational and/or vibratory motion in some combination which may be later altered by outside forces: $E = mc^2 + 1/2mv^2 + 1/2I\omega^2 + 1/2kx^2$. Because the nuclear barrier height is position dependent, current descriptions must include this factor. The classical barrier height is given by $V = kQ_1Q_2/r$. Assuming the nucleus is a 3 dimensional equal amplitude oscillator $r = ([(AcosX)^2 + (AcosY)^2 + (AcosZ)^2])^(1/2)$. For no motion $V = infinitelyhigh$. For average oscillation, $r = RMScos$ and $r = 1.22A$, RMS average, and if $cos = 1$, $r = 1.707A$. The nuclear barrier height then ranges from infinitly high, average RMS $V = 0.816Q_1Q_2A/r$. A low value will be $0.576Q_1Q_2A/r$. A is the average nuclear vibration. Random nuclear vibrations also create a variable nuclear cross sections . If $b = Acosy)$ is the impact parameter in 1 dimension, then cross section $\sigma = \pi(AcosY)^2$ if A =amplitude of nuclear vibration. Therefore, $\sigma = \pi(A)^2$ maximum, $\sigma = \pi(0.707A)^2$ RMS average and $\sigma = 0$ minimum values for the variable nuclear cross sections per nucleus.

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Date submitted: 18 May 2020 Electronic form version 1.4