Exploring the high-order harmonic generation from Rydberg states with a fixed Keldysh parameter\textsuperscript{1} ERDI ATA BLEDA, ILHAN YAVUZ, ZIKRI ALTUN, Marmara University, TURKER TOPCU, Auburn University — The commonly adopted viewpoint that the Keldysh parameter $\gamma$ determines the dynamical regime of ionization in strong field physics has long been demonstrated to be a misleading one. One can then ask what happens in strong field ionization as relevant parameters, such as laser intensity and frequency, are varied while keeping $\gamma$ fixed. We present results from our simulations of high-order harmonic generation (HHG) from Rydberg states of a hydrogen atom. We calculate high harmonic spectra from various initial states with $n$ up to 42, where the laser intensities and the frequencies are scaled from those for $n = 1$ in order to maintain a fixed Keldysh parameter $\gamma < 1$. We find that as we go up in $n$ for a fixed $\gamma$, the position of the cut-off scales as $\sim 1/n^2$ in terms of the cut-off law predicted by the three-step model for $n = 1$. However, a secondary cut-off structure forms below this, which moves to lower harmonics as $n$ is increased. This second cut-off splits the plateau into two regions, one higher in yield and below the second cut-off, and the second with lower yield following it. We further investigate the final $n$-distributions for some of the interesting cases to elucidate the physical mechanism leading to this structure

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