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"Now you see them...Now you don't...Wait, Now you do"

Imaging trapped molecules is more difficult that atoms due to their lack of a closed cycling transition. One recently published approach relies on "depletion spectroscopy" with trapped molecular ions. The technique requires the photo-dissociation products to be no longer trapped. The remaining trapped molecular ions are then dumped and counted to perform the spectroscopy. Our current efforts modify this technique by choosing a molecule in which one of the dissociation products \*will\* remain trapped and can therefore be observed directly by fluorescence and additionally be "reused" for subsequent experiments allowing for faster data taking rates.