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Direct measurements of radiative capture reactions with DRAGON

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Direct measurements of radiative proton and alpha capture reactions are crucial for understanding nucleosynthesis in a variety of astrophysical environments, including classical novae, supernovae, X-Ray bursts, and quiescent stellar burning. Often the most important reactions have very low cross sections or involve unstable targets, making laboratory measurements extremely challenging. The detector of recoils and gammas of nuclear reactions (DRAGON) at TRIUMF is a recoil mass separator designed to measure radiative capture reactions in inverse kinematics, with beam suppression factors as high as 10^{16}. When combined with the intense radioactive beams available at the ISAC-I facility, DRAGON's capabilities are unique and world-leading. In this talk, I will give a brief technical overview of DRAGON before presenting results from recent experiments. Some highlights include the first-ever direct measurement of $^{38}\mathrm{K}(p,\gamma)^{39}\mathrm{Ca}$, a crucial reaction for determining the endpoint of nova nucleosynthesis, and measurements of $^{76}\mathrm{Se}(\alpha,\gamma)^{80}\mathrm{Kr}$. The latter measurements determine the rate of the reverse reaction, $^{80}\mathrm{Kr}(\gamma,\alpha)^{76}\mathrm{Se}$, an important waiting point in the synthesis of the p-nuclei. I will also discuss future (and ongoing) developments at DRAGON, including the commissioning of a new chamber for high-precision elastic scattering measurements and plans to determine the 330 keV resonance strength in $^{18}\mathrm{F}(p,\gamma)^{19}\mathrm{Ne}$ via measurements of $^{15}\mathrm{O}(\alpha,\gamma)^{19}\mathrm{Ne}$ and $^{15}\mathrm{O}+\alpha$ elastic scattering.