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### **Generating ensembles of polyatomic molecules at cold and ultracold temperatures**

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Realizing a source of molecules at cold and ultracold temperatures is a formidable challenge. To this end, our group is following a multipronged approach. As an initial source of molecules, velocity filtering [1] and buffergas cooling [2] can be used. To reduce the velocity of fast molecules from these sources to trappable speeds, we have recently demonstrated a novel centrifuge decelerator [3]. A key feature of this deceleration technique is its ability to decelerate continuous beams. Once the molecules are trapped, we have demonstrated optoelectrical Sisyphus cooling [4] to further reduce the temperature. Our current efforts, focused on combining the various approaches and further reducing the temperature to the submillikelvin regime, will be discussed.

[1] S.A. Rangwala et al., Phys. Rev. A **67**, 043406 (2003)

[2] L.D. van Buuren et al., Phys. Rev. Lett. **102**, 033001 (2009)

[3] S. Chervenkov et al., Phys. Rev. Lett. **112**, 013001 (2014)

[4] M. Zeppenfeld et al., Nature **491**, 570 (2012)