High-flux cold lithium-6 and rubidium-87 atoms from compact two-dimensional magneto-optical traps

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We report the development of a compact setup for producing Fermi gas of ultracold ^{6}Li^{87}Rb molecules, which integrates two 2D magneto-optical traps in series for each species with a short-distance lithium Zeeman slower. The Zeeman slower enhances the lithium flux by a factor of 50, achieving a high flux of 6.6×10^9 atoms/s at a moderate oven temperature of 370 degrees. In addition, the rubidium flux reaches a value of 2.3×10^9 atoms/s. This advancement paves the way for the rapid production of double-degenerate lithium-rubidium atomic mixtures and large samples of ultracold ground-state fermionic lithium-rubidium molecules, providing a robust platform for investigating dipolar interaction and phase transition in ultracold regime.

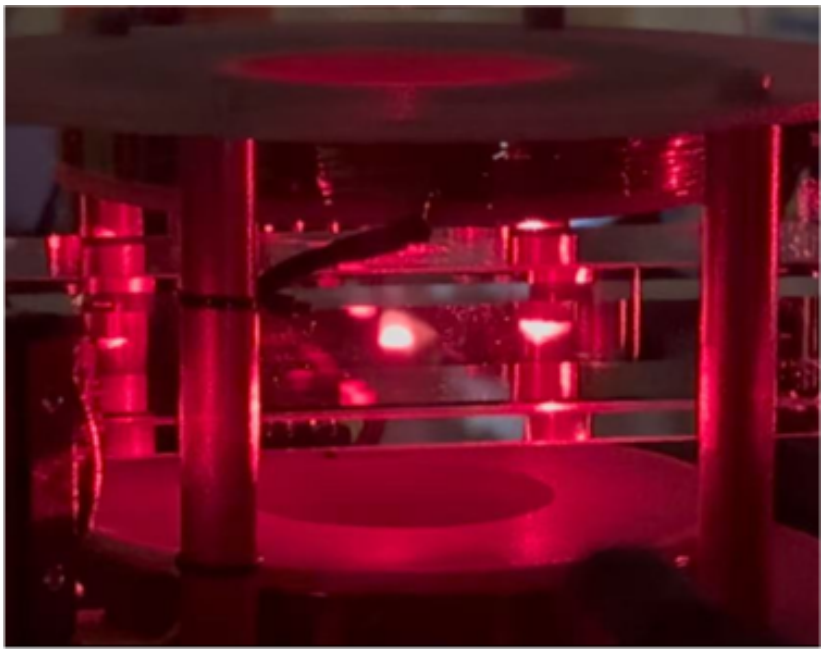

Figure 1: Picture of a lithium and rubidium dual-species 3D MOT loading in a glass cell. The center bright spot is the lithium MOT and the shaded cloud around it is the rubidium MOT.