

**The realistic prospect of being able to separate the cavity and absorber resonances very strongly: expecting an optical molecular frequency standard with a stability and reproducibility at the Hz level**

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Detailed analysis shows that saturated absorption of CO<sub>2</sub> in a proper cavity can give ~3% increased cavity-transmitted power at the molecular resonance frequency near 1560 nm. While the JILA vertical vibration-resistant cavity design was demonstrated to give sub-Hz linewidth of the locked laser, the calculated high molecular resonance S/N promises absolute frequency stability at the Hz level at 1s and beyond. In addition to NICE-OHMS, the toolbox now contains a new anti-RAM solution, the "RAM-Buster", which has shown Residual AM control of < 3 ppm for days, where the non-zero limit came from spurious rf pickup in the photodetector of the first setup.

References

Control of residual amplitude modulation below  $1 \times 10^{-6}$  for laser frequency stabilization, Hall, John L.; Zhang, Wei; Ye, Jun to appear in IEEE Proc 2015 International Frequency Control Symposium.