

# Laser cooled fermionic BaF molecules for measuring nuclear-spin-dependent parity violation

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We demonstrate optical cycling and transverse laser cooling of a beam of fermionic  $^{137}\text{BaF}$  molecules. Their high masses and nuclear spins make these molecules sensitive probes for parity violation and properties of the weak interaction. However, the nuclear spins also lead to a quasi-closed cycling transition currently involving up to 112 levels, which significantly exceeds the complexity in other laser-cooled molecules. Optical cycling and cooling are facilitated through carefully designed optical spectra tailored to this molecular structure. Our results pave the way for efficient state preparation, detection, and cooling in precision measurements using this species and other similar species.

## References

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