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Ultracold triplet Rb₂ molecules in the rovibrational ground state

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The field of ultracold atoms has led to many interesting and fascinating developments in recent years. This success has also generated a quest for ultracold quantum degenerate ensembles of molecules. However, molecules have a complex inner structure and cannot be laser cooled. One pathway to cold molecules is to start with ultracold atoms and associate them via controlled collisions in molecular bonds. These molecules are typically weakly bound and quite fragile. We have developed a method to coherently change the molecular bond strength by efficiently transferring weakly bound Rb₂ molecules to their rovibrational ground state via a stimulated Raman transition. As a consequence, a nearly quantum degenerate gas of tightly bound Rb molecules is generated with new exciting perspectives for future experiments.