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Alignment of D-state Rydberg molecules ROBERT LÖW, ALEXANDER KRUPP, ANITA GAJ, JONATHAN BALEWSKI, PHILIPP ILZHÖFER, SEBASTIAN HOFFERBERTH, University of Stuttgart, MARKUS KURZ, PETER SCHMELCHER, University of Hamburg, TILMAN PFAU, University of Stuttgart
— For highly excited Rydberg atoms with principal quantum numbers n $\sim$ 40, single ground state atoms can be trapped in the potential created by the Rydberg electron, leading to so called trilobite Rydberg molecules. Until now mostly S-states have been studied in terms of lifetime, coherence properties, dimers, trimers and polymers, permanent electric dipole moments, etc. Recently we have extended this class of molecules by D-state molecules offering more complex azimuthal structures. By choosing various magnetic substates, well separated by a magnetic offset field, we are able to address specific ro-vibronical states. A peculiar property of our excitation scheme is that the resulting Rydberg molecules are excited to stationary states with a high degree of alignment or anti-alignment.

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