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Radiative lifetime of excitons and trions bound to Te isoelectronic centers in ZnSe[1] ANNE-LAURENCE PHANEUF-L'HEUREUX, PHILIPPE ST-JEAN, SEBASTIEN FRANCOEUR, Polytechnique Montreal — Atomic defects are interesting candidates for the realization of exciton and spin qubits. Isoelectronic centers in semiconductor materials are particularly appealing as they combine the narrow linewidth transitions and homogeneity of quantum defects like nitrogen-vacancy centers in diamond with the high dipole moments of large nanostructures like quantum dots. In this work, we study the emission from pairs of tellurium atoms in ZnSe. This pseudo-donor isoelectronic center can bind a hole, an exciton, a trion, or a biexciton. We report on the emission lifetime and, through resonant luminescence and Rabi oscillation measurements, we evaluate the dipole moment of excitons and trions, which can be relatively large due to the particular binding mechanism of these complexes to isoelectronic centers. Thus, by providing strong interactions with photons, these semiconductor defects are promising spin-photon interfaces.

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