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Spectral and spatial redistribution at the LaAlO₃/SrTiO₃ interface T. GUENTER, A. RUBANO, T. FINK, HISKP, University Bonn, Germany, D. PAPARO, F. MILETTO GRANOZIO, U. SCOTTI DI UCCIO, L. MARRUCCI, Dip. di Scienze Fisiche, University Naples, Italy, J. MANNHART, MPI for Solid State Research, Stuttgart, Germany, M. FIEBIG, Materials Departement, ETH Zürich, Switzerland — A conductive two-dimensional electron liquid (2DEL) appears at the LaAlO₃/SrTiO₃ (LAO/STO) interface for a LAO thickness of $n \ge 4$ unit cells. Despite the tremendous research interest, many questions regarding the origin and characteristics of the 2DEL have to be addressed yet. In particular, this includes the electronic structure of the "buried interface." Optical second harmonic generation (SHG) is an ideal tool for studying interfaces, since it is sensitive to the interfacial symmetry breaking along the stacking direction. Using SHG with frequency-tunable amplified femtosecond laser pulses we obtain information about the structural reorganization of the interfacial STO conduction band for SHG photon energies up to 6.2 eV. A massive spectral weight redistribution is present for $n \ge 3$, indicating a global reorganization of the conduction band structure. At low temperatures the spectral resolution is enhanced which alleviates the distinction of interfacial electronic transitions. Additionally, we discuss the modification of the interfacial states by variation of the STO surface termination. Our data are supported by a theoretical framework based on symmetry selection rules that allows a specific assignment of interfacial O(2p)-Ti(3d) transitions to the SHG spectrum. HISKP, University Bonn, Germany T. Guenter

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