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Optically pumped semiconductor lasers for atomic and molecular physics[1] SHAUN C. BURD, National Institute of Standards and Technology, University of Colorado Boulder, JUSSI-PEKKA PENTTINEN, Tampere University of Technology, ANDREW C. WILSON, DAVID T. C. ALLCOCK, DANIEL H. SLICHTER, National Institute of Standards and Technology, Boulder CO, RAGHAVENDRA SRINIVAS, National Institute of Standards and Technology, University of Colorado Boulder, MIRCEA GUINA, Tampere University of Technology, DIETRICH LEIBFRIED, DAVID J. WINELAND, National Institute of Standards and Technology, Boulder CO — Experiments in atomic, molecular, and optical (AMO) physics rely on lasers at many different wavelengths and with varying requirements on spectral linewidth, power, and intensity stability. Optically pumped semiconductor lasers (OPSLs), when combined with nonlinear frequency conversion, can potentially replace many of the laser systems currently in use. We present single-frequency OPSL systems developed by our group for use in photoionization of neutral magnesium atoms and also for laser cooling and quantum state manipulation of trapped $^{25}Mg^{+}$ ions. We also report progress on developing OPSLs to perform these tasks for $^{9}Be^{+}$ ions. Our OPSL systems serve as prototypes for applications in AMO requiring single-frequency, power-scalable laser sources at multiple wavelengths.

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