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**Decoherence Times of Rabi Oscillations in Micro-Plasmas**<sup>1</sup> DMITRI ROMANOV, GEORGE HECK, ALEX FILIN, ROBERT LEVIS, Center for Advanced Photonics Research, Temple University — We study the broadband Rabi oscillations supported by excited states of oxygen atoms in a microplasma. The contrast of characteristic fringe patterns of spectral interference in dynamic Rabi sidebands is determined by decoherence phenomena in a nonequilibrium underdense microplasma channel formed in atmospheric-pressure oxygen gas via interaction with a femtosecond pump pulse. We have established the decoherence rate as a function of the pump pulse intensity, and we have traced the evolution of the decoherence rate as the microplasma evolved toward equilibrium. The rate increases with the pump laser intensity and decreases with the delay with corresponding decoherence times in the range of 750 fs to 3 ps, in good agreement with theory revealing that electron scattering dominates the dynamics for the subnanosecond relaxation processes. The results provide insight into both the behavior of the transient effective two-state systems and the evolution of the characteristics of the laser-generated microplasma.

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