Impact of Ozone and Oxygen on Early Stage Decay of Transitionally- and Over-dense Meteor Trails

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Temperatures in overdense and transitionally dense meteor trails during the early stages of trail formation can be of the order of 6000K to 10000K, and the hypersonic entrance speeds can lead to significant shock-fronts. These environmental conditions can lead to new classes of hyperthermal chemistry during the first few hundred milliseconds of the trail, and also may prime conditions for later reactions as well. In this talk, we describe the early-stage state of the trail and the associated chemistry, and examine its eventual impact. The results help explain both the trail lifetime and also the fact that larger meteor trails often appear visually as hollow glowing cylinders.