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Discharge of Electrically Charged Clouds

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Abstract: In a one year program, we have established a new mechanism for triggering **lightning** using low energy (less than 1 mJ) ultrashort (subpicosecond) pulses. A pre-ionized 'needle-shaped' path is created by three to four photon ionization of oxygen or applied field results in a local enhancement of the field, sufficient to reach avalanche breakdown. Measurement of multiphoton ionization cross section have established that a few mJ/sq cm in 200 fs at 248nm are sufficient to create 1013 electrons per cu cm. Laser induced discharge of 90 KV over 25 cm have been demonstrated with ns pulses at 248nm, at pressure of 1/7 atm. This result and the theory indicate that less than 1 mJ in less than 1 ps duration pulses at 248nm should induce the discharge at atmospheric pressure. A fs laser oscillator-amplifier has been assembled to perform such **tests.... Lightning**, Laser, Triggered **lightning**.

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