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Investigations on a thin cathode discharge in argon at atmospheric pressure SEBASTIAN MOHR, BEILEI DU, DIRK LUGGENHOELSCHER, UWE CZARNETZKI, Ruhr-University Bochum — The thin cathode discharge (TCD) consists of two electrodes separated by a dielectric layer which is about 100 μm thin. The cathode is of the same dimension as the dielectric layer, while the shape of the anode can be chosen arbitrarily. The discharge burns in a hole with a diameter of 200 μm drilled through this setup. Due to the small dimension, the TCD can be operated at pressures up to atmospheric pressure. When operated at such high pressures, the TCD shows a self-pulsing behavior which is caused by the repeated ignition of a short-living spark discharge. In this self-pulsing mode, electron densities of several 10^{16} cm^{-3} can be reached and maintained over several 100 ns. However, due to the high collision frequencies at these high pressures, the lifetime of the afterglow should be much shorter. To find an explanation for this long lifetime, a kinetic model of the afterglow was developed. It showed that the prolonged afterglow is caused by the high density of metastables which produce and heat electrons by various processes like Penning-ionization and superelastic collisions.

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