

P2.3005 High-pressure gases breakdown in strong longitudinal magnetic fields

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See the full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P2.3005.pdf>

Here we present the results of experimental studies on the effect of an external longitudinal magnetic field in a high pressure discharge. Fig. 1 shows typical experimental time dependences of the voltage (upper), current density (middle) and calculated conductivity (lower) in the channel (argon, $H=1.6 \cdot 10^7$ A/m, $P=3$ atm.). We've found that a longitudinal magnetic field leads to: (i) an increase in current density, conductivity, specific energy input, and plasma temperature, (ii) a decrease of formation times in all stages, transverse integral radiation, channel expansion rate, and (iii) shifts the maximum spectral radiation density in the ultraviolet region with the generation of new spectral lines. Explaining our results we can conclude that because of the expansion rate of the spark channel is greater than the diffusion rate of the magnetic field lines, the expanding spark channel shifts the magnetic field lines, reducing them in the center and increasing at the electrodes (cathode and anode), and therefore the system acquires the properties of a magnetic mirror trap [1], and it leads to the significant increase in the channel temperature. This approach can be used to create a source of intense X-ray and ultraviolet radiation and other applications.

[1] O.A. Omarov, et al. 2019 High Temperature 57

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