VII Leopoldo García-Colín Mexican Meeting on Mathematical and Experimental Physics



Contribution ID: 87

Type: not specified

ARTURO ROBLEDO: Effect of the sample's temperature on the line emission in laser ablation at cryogenic temperatures.

Wednesday, 19 February 2020 16:00 (45 minutes)

We report results obtained in a laser-ablation experiment using targets chilled down to 20 K. In a previous work, our co-workers found that by increasing the temperature of the target above room temperature the emission of the lines increased in proportion to the target's temperature [1]. In the present work we applied the focused beam of a pulsed, nanosecond Nd:YAG laser on a metallic surface that is in contact with the cold finger of a He refrigerator. In this way the sample's temperature could be varied in the interval 20-290 K. The sample and the cold finger were kept in a high vacuum in order to obtain good thermal insulation. In the present work we noticed a slight increment in the emissivity of the lines as the temperature increased. The most notable effect however, one that was unexpected, is that at low temperatures ("20K) the electron density of the plasma was found to be higher than at room temperature. The explanation for this behavior is attributed to a pre-heating of the target before plasma onset. This is a consequence of the sharp variation of the sample's specific heat with temperature, according to Debye's theory.

References

[1] E. Alvarez-Zauco et al, Applied Physics B 108 (2012) 867-873.

Session Classification: SHORT TALKS

Track Classification: SYMPOSIUM ON LASER ABLATION