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Balmer series emission in the afterglow of high-pressure, laser-induced hydrogen and hydrogen-argon plasmas LUTZ HÜWEL, Wesleyan University, TOM MORGAN, Wesleyan University, BILL GRAHAM, Queen's University Belfast — The afterglow of photoionised plasmas created in hydrogen and hydrogen with a small fractional addition of Ar (3.5 %) has been studied by focussing a 15 ns, 10 Hz, 1064 nm laser pulse into gas that is at a pressure of 10^5Pa. At the focus, the laser power density is about 10^{11} W/cm^2. Light emission is dispersed by a 0.6 m monochromator, with a 1220 line/mm grating blazed at 500 nm and detected using an image-intensified linear diode. In pure hydrogen, Hα, Hβ, and Hγ emission was observed to about 4 μs. In the mixture, the peak emission intensity is enhanced by a factor of about 2, Hδ and Hε lines are also observed, and the emission of the Hα and Hγ was observable to about 6 μs. The electron density, determined from Stark-broadening, is found to have a complex temporal behaviour. From an initial value at 0.3 μs of about 3.5×10^{16} cm^{-3} in pure hydrogen and 6.5×10^{16} cm^{-3} in the H_2/Ar mixture, the density falls by an order of magnitude by 1.5 μs. Thereafter, in pure hydrogen, an increase in density by about 1×10^{15} cm^{-3} over a period of about 1 μs is observed, followed by a decrease. In the mixture, a plateau occurs in the density temporal behaviour. It is also found that the line emission intensity decay rate changes at about 1.5 μs (pure). WG was a Mellon Fellow at Wesleyan University.

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