

Abstract Submitted
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Ion acceleration in Ar-Xe and Ar-He plasmas¹ EARL SCIME, IOANA BILOIU, West Virginia University — Ion velocity distribution functions (ivdf) are investigated by laser induced fluorescence in Ar-Xe and Ar-He expanding helicon plasmas as a function of gas composition. In the case of Ar-Xe plasma it was found that in the helicon source both Ar⁺ and Xe⁺ vdfs are unimodal. Their parallel speeds are subsonic and unaffected by changes in gas composition. At the end of the source the argon ivdf shows a bimodal structure indicative of an electric double layer upstream of the measurement location. The fast argon ion component parallel velocity increases with Xe fraction from 6.7 to 8 km/s as the Xe fraction increases from 0 to 4%. In the expansion region, the bimodal character of Ar ivdf is maintained with a supersonic fast component reaching parallel speeds of 10.5 km/s. For all studied plasma conditions and different spatial locations, the Xe⁺ vdf exhibits a unimodal structure with a maximum parallel flow velocity of 2.2 km/s at the end of the source. For Ar-He plasma, the Ar ivdf is bimodal with the fast ion component parallel velocity increasing from 5.2 to 7.8 km/s as the He fraction increases from 0 to 30%. For the same He fraction range, the slow argon ion population distribution changes from a single Gaussian to a wide distribution extending all the way from the speed of the fast population to 0 m/s.

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