

# FIP Enhancement by Alfvén Ionization

D A Diver, L Fletcher and H E Potts  
Department of Physics and Astronomy,  
Kelvin Building,  
University of Glasgow,  
Glasgow G12 8QQ

## **Abstract**

Alfvén ionization is offered as a possible mechanism underlying the enhanced population of low First Ionization Potential (FIP) species in the solar corona. In this process, the photospheric flow impinging on the magnetic structure of a coronal flux tube collides with, and displaces, ions in the magnetised plasma within the flux tube. This leads to pockets of charge imbalance that persist due to the impeded electron transport perpendicular to the magnetic field. The localised electric field then energises electrons to the impact ionization energy threshold of low FIP components in the surface flow. Such species remain trapped in the plasma, and drift up the magnetic structure, causing a localised population enhancement compared to photospheric levels. We find that this mechanism successfully accounts for observed biases for flow speeds known to exist in the photosphere, and moreover explains certain anomalous abundances which do not fit into existing theories.