Coronae of stars with super-solar elemental abundances

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Coronal elemental abundances are known to deviate from the photospheric values of their parent star, with the degree of deviation depending on the First Ionization Potential (FIP). This study focuses on the coronal composition of stars with super-solar photospheric abundances. We present the coronal abundances of six such stars: 11 LMi , iota Hor, HR 7291, tau Boo, and alpha Cen A and B. These stars all have high-statistics X-ray spectra, three of which are presented for the first time. The abundances measured in this paper are obtained using the line-resolved spectra of the Reflection Grating Spectrometer (RGS) in conjunction with the higher throughput EPIC-pn camera spectra on board the XMM-Newton observatory. A collisionally ionized plasma model with two or three temperature components is found to represent the spectra well. All elements are found to be consistently depleted in the coronae compared to their respective photospheres. For 11 LMi and tau Boo no FIP effect is present, while iota Hor, HR 7291, and alpha Cen A and B show a clear FIP trend. These conclusions hold whether the comparison is made with solar abundances or the individual stellar abundances. Unlike the solar corona where low FIP elements are enriched, in these stars the FIP effect is consistently due to a depletion of high FIP elements with respect to actual photospheric abundances. Comparing to solar abundances (instead of stellar) yields the same fractionation trend as on the Sun. In both cases a similar FIP bias is inferred, but different fractionation mechanisms need to be invoked.