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Short_Oral_36: Runaway electron velocity-space observation regions of bremsstrahlung hard X-ray spectroscopy

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The reconstruction of the distribution function of runaway electrons (RE) in magnetically confined fusion plasmas can give insights on the runaway electron beam dynamics during plasma disruptions and it may help at understanding the effect of disruption mitigation techniques on the RE velocity space. When RE are assumed to be purely co-passing, i.e. to have a pitch=1, a one dimensional inversion technique can be used to infer their energy distribution function from the bremsstrahlung spectrum. However, this holds only as an approximation, as the bremsstrahlung cross section depends also on the pitch of the electrons, besides energy, and this may deviate from unity. In view of enabling a two-dimensional, energy-pitch reconstruction of the RE velocity space, in this work we present a calculation of the weight functions for the bremsstrahlung emission by the RE. The weight functions allow bridging the bremsstrahlung spectrum with the RE velocity space, as they tell the region of the velocity space that contributes to a particular spectral measurement. The results are applied to investigate the RE velocity-space sensitivity of the hard X-ray diagnostic installed at the Joint European Torus.

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