

## A rigorous method to determine the saturation current of ionisation chambers in the recombination regime

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### Resumo

In this work we apply a rigorous method to obtain the saturation current  $I_{\text{sat}}$  of a  $4\pi\gamma$  ionisation chamber under very intense  $\gamma$  radiation from a  $^{192}\text{Ir}$  solid source ranging from 27 GBq (0.75 Ci) to 4.1 TBq (110 Ci). We determine  $I_{\text{sat}}$  by fitting experimental results to a finite series of powers of  $1/V^2$  obtained from the perturbative solution of the Thomson problem when space charges are neglected. We show that only few terms of the series expansion are needed to achieve a good fit. We conclude suggesting that this method should be preferred to traditional ones when inferring  $I_{\text{sat}}$  from measurements in the recombination region in the case where volume recombination is predominant.