cD galaxy contribution to the strong lensing cross sections of galaxy clusters
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abstract We perform ray-tracing simulations evaluating the effect of a cD galaxy on the strong lensing properties of five galaxy cluster halos obtained from N-body simulations. The cD galaxy is modelled using both axially symmetric and elliptical models and assuming several masses for its dark matter halo. The effect of the cD orientation with respect to the mass distribution of the host galaxy cluster is also investigated. The simulations are carried out in an open and a flat model universe with cosmological constant. We find that the enhancement of the cluster lensing cross sections for long and thin arcs due to the presence of a massive cD at the cluster centre is typically less than 100\%, depending on the model used for the cD galaxy and its orientation. The impact of the cD on the cluster efficiency for producing radially magnified images is larger only for those clusters whose lensing cross section for radial arcs is very small in absence of the central galaxy. We conclude that the presence of a cD galaxy at the cluster centre can only moderately influence the cluster efficiency for strong lensing and in particular fails to explain the discrepancy between the observed number of giant arcs in galaxy clusters and their abundance predicted from lensing simulations in the currently most favoured ΛCDM model.