IAUS-REG-NUMBER: IAUS-133
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TITLE: A study of the slit configuration effect on the H$_2$ 1-0 S(1) to Brγ line ratio in planetary nebulae
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ABSTRACT:
Ratios of lines that are produced in different regions depend strongly on the slit configuration used in spectroscopic observations of extended objects. In this work, observations and numerical simulations are used to study and quantify such effect on the H$_2$ 1-0 S(1)/Brγ ratio (R(Brγ)) in PNe, with the aim to assist the interpretation of observations and their comparison to models. The presented analysis shows that observed R(Brγ) ratios reach only values up to 0.3 when the slit encompasses the entire nebula. Values higher than that are only obtained when the slit covers a limited region around the H$_2$ peak emission, where the Brγ emission is then minimized. The numerical simulations show that, when the effect of the slit configuration is taken into account, photoionization models can reproduce the whole range of observed R(Brγ) in PNe, as well as the behaviour described above. The popular argument that shocks are needed to explain the higher values of R(Brγ) is thus not necessary. Moreover, this ratio is not a good indicator of the H$_2$ excitation mechanism as suggested in the literature.