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A thermal model of Rosetta/ROSINA/DFMS to assess the effects of solar illumination and thermal inertia of the mass spectrometer on mass spectra at 67P/Churyumov-Gerasimenko

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The coma composition of comet 67P/Churyumov-Gerasimenko is being analysed in detail with the high mass resolution Double Focussing Mass Spectrometer (DFMS) that is part of the ROSINA instrument suite on board of the Rosetta spacecraft. The Rosetta spacecraft – and DFMS in particular – experiences changing behaviour as the temperature varies with illumination and distance from the Sun. This contribution highlights these changes and their practical consequences for the interpretation of the DFMS mass spectra. A thermal model is presented that addresses thermal behaviour on a long time scale, related to instrument illumination and thermal gradients inside DFMS, and on a short time scale, related to transients after on/off cycling of the instrument and thermal inertia. Both issues adversely affect the problem of establishing a proper instrument mass calibration.