Multi-Object Spectroscopy in the Next Decade: Big Questions, Large Surveys and Wide Fields
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Revisiting the impact of atmospheric dispersion and differential refraction on MOS observations. From VLT/VIMOS to next generation instruments

R. Sánchez-Janssen[1,2], S. Mieske[2], F. Selman[2], P. Bristow[3], P. Hammersley[3], M. Hilker[3], M. Rejkuba[3], B. Wolff[3],

[1] *NRC Herzberg Astronomy & Astrophysics, 5071 West Saanich Road, Victoria V9E2E7, Canada*
[2] *European Southern Observatory, Alonso de Córdova 3107, Santiago, Chile*
[3] *European Southern Observatory, Karl-Schwarzschild-Strasse 2, D-85748 Garching bei München, Germany*

Abstract

MOS observations with VIMOS at the VLT have traditionally been limited to a narrow two-hour range from the meridian to minimise slit losses caused by atmospheric dispersion and differential refraction. We revisit the impact of these effects on the quality of VIMOS-MOS spectra through extensive simulations of slit losses as a function of both target declination and slit orientation. We show that, for fields culminating at zenith distances larger than 20 degrees, slit losses are minimised with slits oriented along the parallactic angle at the meridian. Conversely, for fields with zenith angles smaller than 20 degress at culmination, losses are minimised with slits oriented perpendicular to the parallactic angle at the meridian; MOS observations can be effectively extended to plus/minus three hours from the meridian in these cases. In general, night-long observations of a single field will benefit from using this latter orientation. All-sky or service mode observations, however, require a more elaborate planning that depends on the target declination, and the hour angle of the observations. We establish general rules for the alignment of slits in MOS observations that increase target observability, enhance the efficiency of operations, and speed up the completion of programmes.