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## Relativistic effects in stellar orbits and gas around the Galactic Center black hole

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The supermassive black hole in the center of our galaxy is the closest of its kind and the largest in the sky. It is surrounded by a small cluster of high velocity stars called S-stars. Their trajectories are governed by the gravitational field of the black hole. We used the Very Large Telescope (VLT) instruments GRAVITY and SINFONI to follow the star S2/S-02 during its pericenter passage, collecting astrometric and spectroscopic data, respectively. These joint data allow a now robust detection of the combined gravitational redshift and transverse Doppler effect for S2/S-02. During high emission states (bright flares), GRAVITY also recorded continuous changes in position and polarisation of the IR source Sgr A\* itself. These are attributed to a compact source of synchrotron emission (hot spot) from the innermost stable circular orbit around the black hole. I will discuss how we obtained our recent result and what it means in the context of gravity theories.

### Summary

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**Session Classification:** General Relativity & Cosmology

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