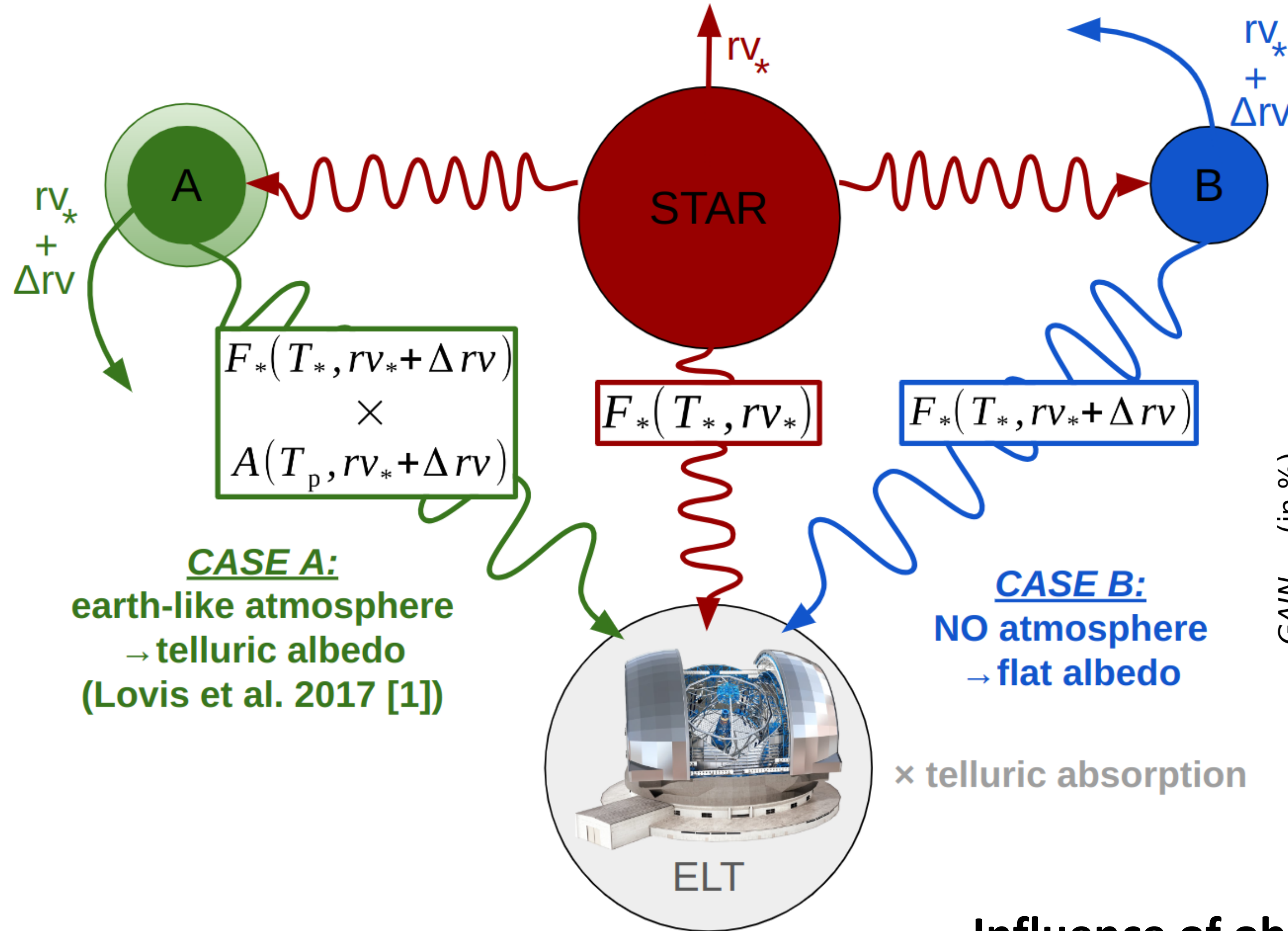


Best instrument and observational parameters to detect reflected light planets

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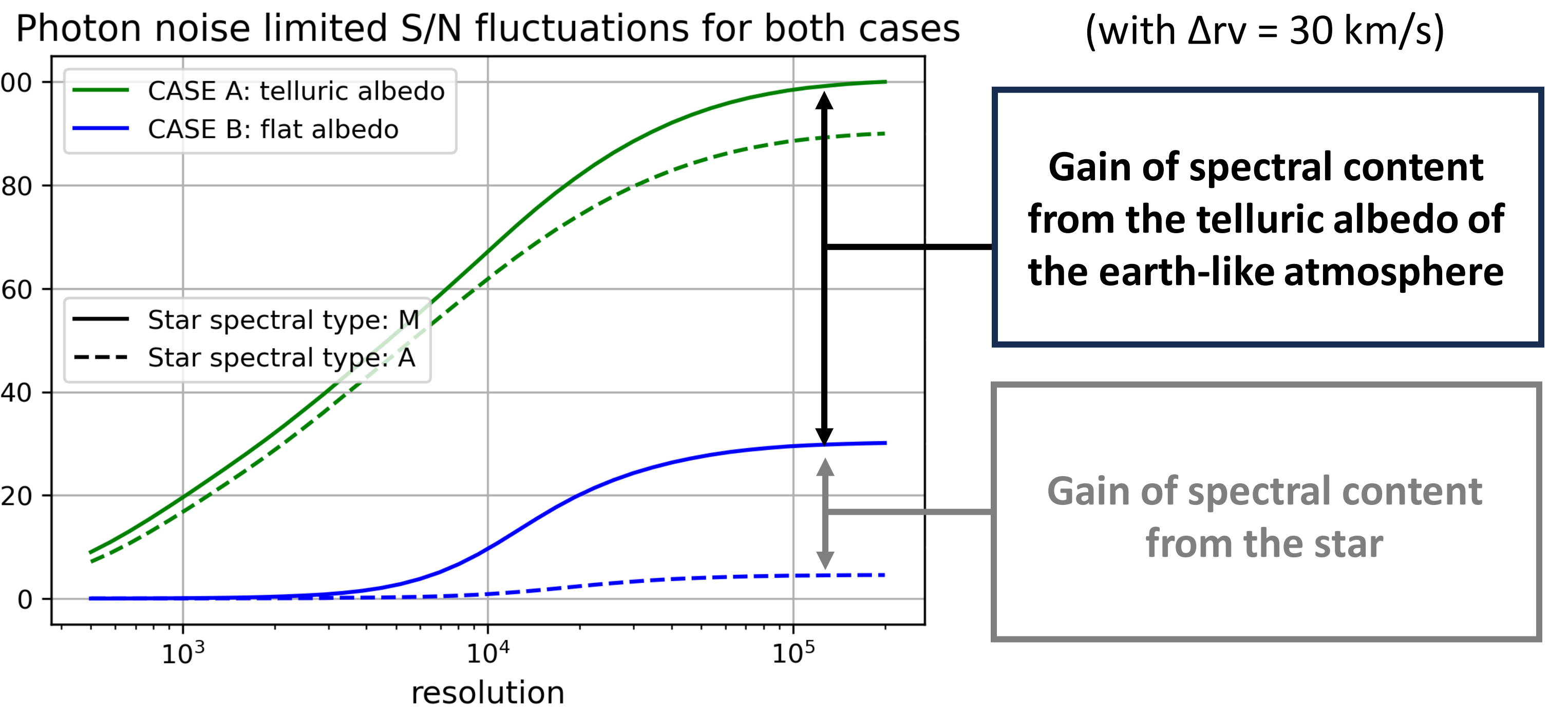
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Abstract: Improving the **contrast and minimum separation** will open up the window to **imaging planets in reflected light**. The combination of high-resolution spectroscopy with high-contrast imaging will be a major advantage, in the regime where the residual stellar halo remains significant, as expected from the ground on ELTs. We **explore a range of observation parameters** to quantitatively evaluate the actual ultimate performance of this approach in various astronomical cases (in terms of **stellar, planetary and orbit properties**). We discuss the combination of the instrument high-level properties including both the high-contrast imaging performance and the spectroscopic properties (**spectral range and resolution**, Bidot et al. 2024 [2]), covering various possibilities, and **focusing on ELT-HARMONI, and ELT-ANDES, among the instruments that our method can consider.**

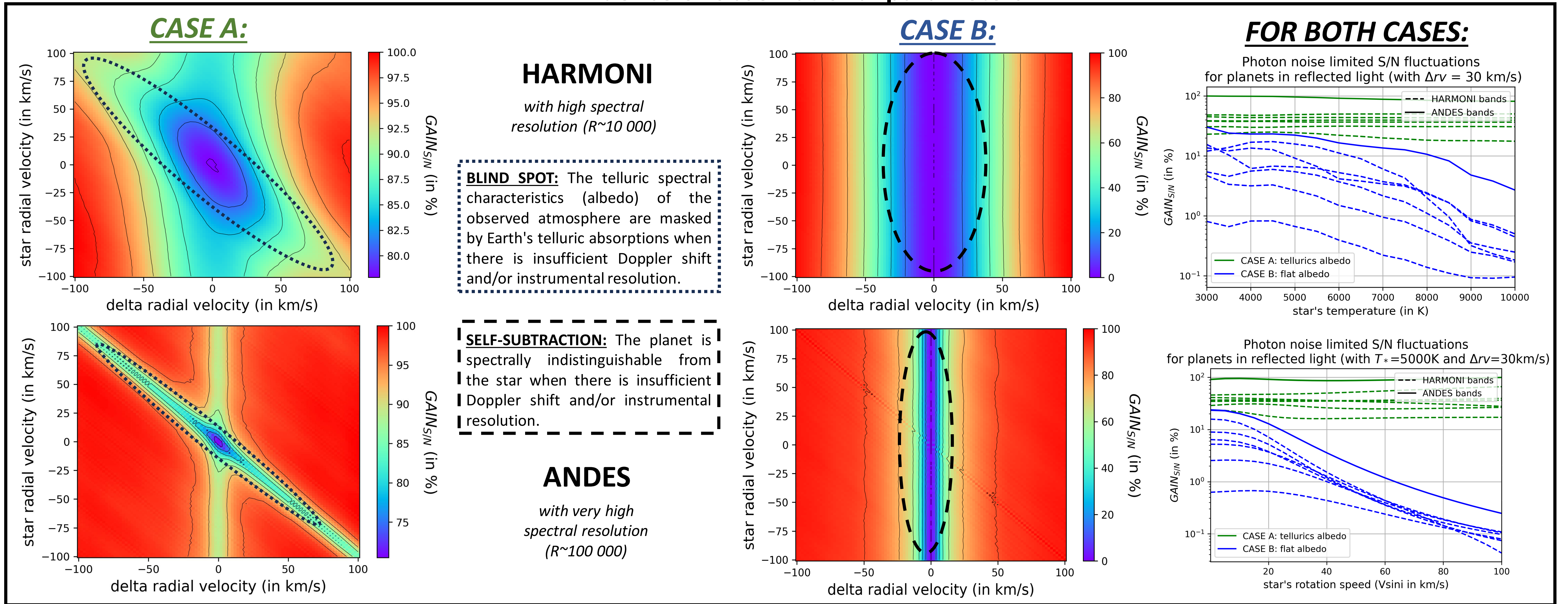


spectral correlation signal = $\alpha - \beta$

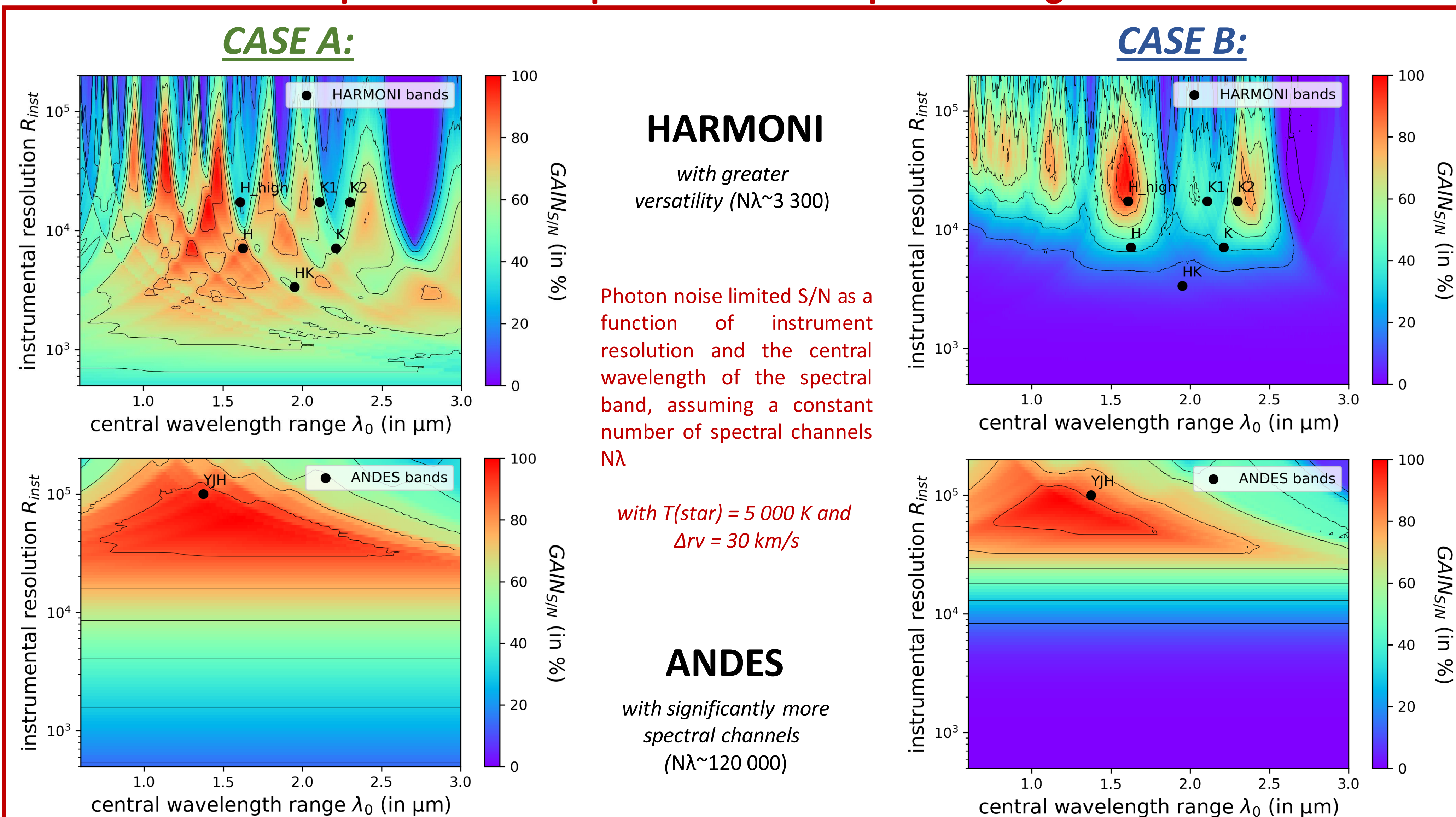
- α = high-frequency spectral content of the planet (based on the planet's properties)
- β = self-subtraction term: similarity degree between the star and the planet that cannot be used to discriminate the planet from the star (minimized if the Doppler shift between planet and star and/or the instrumental resolution is sufficiently important)



Influence of observational parameters:

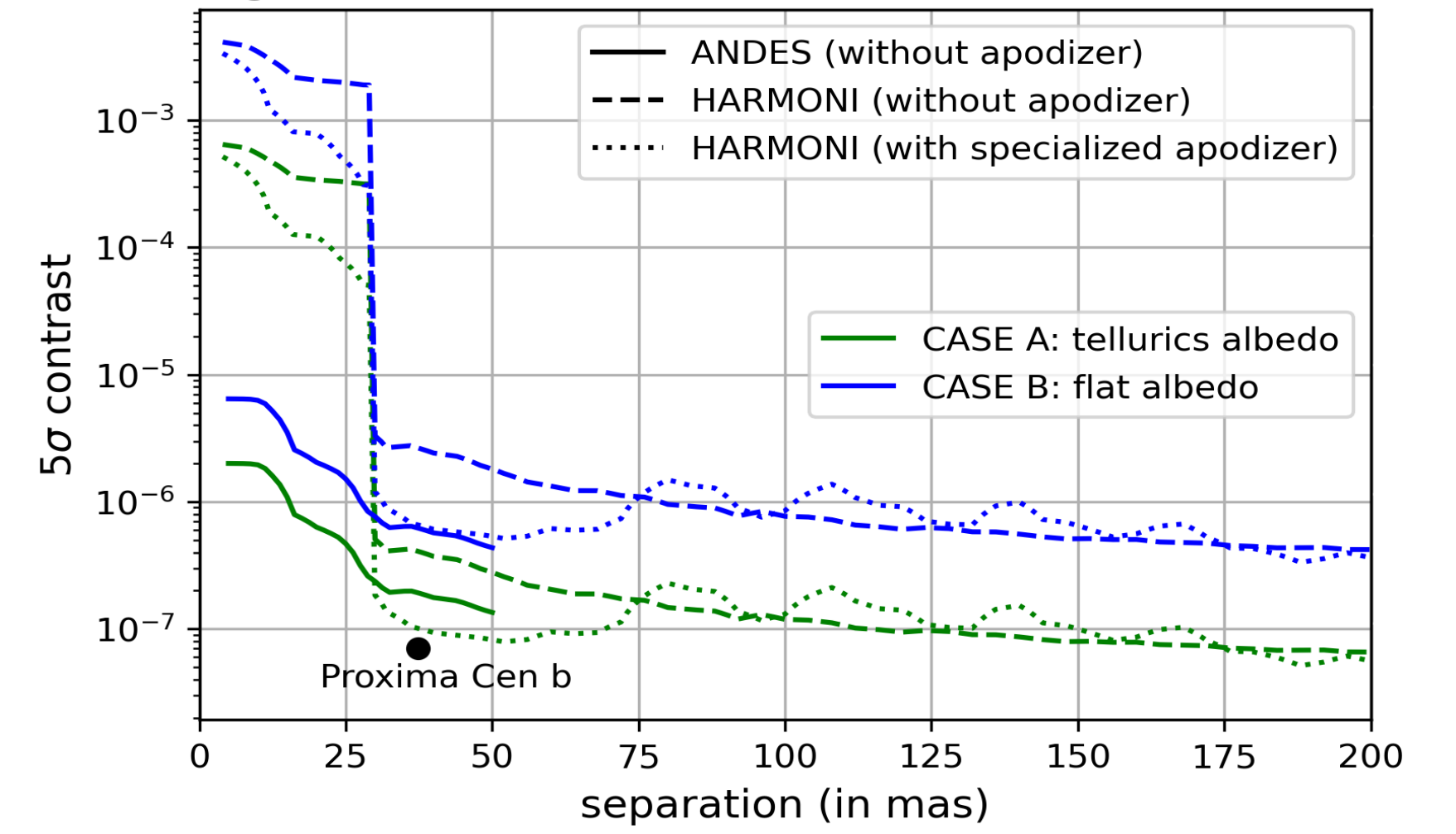


Instruments parameters: importance of the spectral range and resolution



Case of Proxima Cen b

HARMONI vs ANDES molecular mapping contrast curves for Proxima Cen b with $t_{exp} = 3$ hours, $T_* = 2,900$ K, $mag_*(K) = 4.4$, $rv_* = -22$ km/s and $\Delta rv = -43$ km/s



HARMONI vs ANDES molecular mapping S/N curves for Proxima Cen b with $T_* = 2,900$ K, $mag_*(K) = 4.4$, $rv_* = -22$ km/s and $\Delta rv = -43$ km/s

