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Radiation Fields, Effects and Risks in Human Space Missions (5)

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OPTIMUM WAVELENGTH FOR HUMAN VISION ON EARTH-LIKE PLANETS AROUND OTHER STARS

**Abstract**

Human vision plays an important role in our perception of the surrounding environment. Understanding its evolution through human evolution is of interest in different branches of science and technology, from physics, biology to bio engineering and space applications. Successfully understanding the factors affecting and driving the evolution of human vision provides the opportunity to search for missed information and also to develop suitable instruments for planetary exploration and atmospheric studies. In this work, we follow the idea that the evolution of human vision is driven by information content in the radiation, i.e., spectral entropy along with the energy of radiation as hypothesized by [Delgado-Bonal and Martín-Torres, 2016]. We derive the optimum information wavelength for all discovered exoplanets (3900 exoplanets), orbiting stars of different spectral types and hypothesize spectral range of human vision on these planets. Based on the obtained optimum information wavelength and its spectral band, the exoplanet systems are categorized. We also determine the optimum information wavelength on Earth-like exoplanets with hypothetical atmospheres around sun-like stars and present the effects of different stellar radiation combined with different atmospheric conditions/compositions on the evolution of vision for human-like life forms using line-by-line radiative transfer models.

References:

Delgado-Bonal, A. and Martín-Torres, J. (2016). Human vision is determined based on information theory. *Scientific Reports*, 6(1).