

Testing the variation of fundamental constants by astrophysical methods: overview and prospects

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Abstract. By measuring the fundamental constants in astrophysical objects one can test such basic physical principles as space-time invariance of physical laws along with probing the applicability limits of the Standard Model of particle physics.

The latest constraints on the fine structure constant α and the electron-to-proton mass ratio μ obtained from observations at high redshifts and in the Milky Way disk are reviewed.

In optical range, the most accurate measurements have already reached the sensitivity limit of available instruments, and further improvements will be possible only with next generation of telescopes and receivers. New methods of the wavelength calibration should be realized to control systematic errors at the sub-pixel level.

In radio segment, the main tasks are the search for galactic and extragalactic objects suitable for precise molecular spectroscopy as well as high resolution laboratory measurements of molecular lines to provide accurate frequency standards.

The expected progress in the optical and radio astrophysical observations is quantified.