

**NINS Astrobiology Center
Project: The origin of terrestrial
bioorganic homochirality
relevance to asymmetry of the
universe - Approaches with
synergy effects of observations,
experiments and computations**

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Full explanation of the origin of terrestrial bioorganic homochirality (enantiomeric domination of L-form amino acids in proteins and D-form sugars in DNA/RNA) is one of the most important problems in astrobiology. One attractive hypothesis in the context of astrobiology (cosmic scenario) has been advocated that asymmetric radiations in space, such as circularly polarized photons or spin-polarized electrons, have induced asymmetric conditions on primitive interstellar media [1]. We are executing cooperative works between three aspects of approaching methods (observations, experiments and computations) to clarify the cosmic scenario as below:

(1) Astronomical observations of circularly polarized radiation from various star-forming regions in space, using highly sensitive polarization detecting systems settled in the astronomical observatories.

(2) Simulated experiments with polarized quantum beams from high-energy particle accelerators irradiating amino acids or sugars and their precursor molecules, and following chemical and optical measurements of enantiomeric excesses.

(3) First principal simulating calculations of asymmetric optical responses and following asymmetric chemical reactions for amino acids or sugars and their precursor molecules.

The synergy effects of the approaches are expected to resolve the problems of the origin of terrestrial biological homochirality.

[1] Bonner (1991), *OLEB* **21**, 59-111.