

# Primordial Chemistry

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Molecules are found in a large variety of astronomical environments. They are now widely used as diagnostic probes of the physical conditions in which they occur, and the diversity of molecular environments has helped to stimulate interest in a variety of different chemical processes [1].

We know that primordial molecules appeared early in the history of our universe. The understanding of molecular formation as a consequence of cosmological recombination is of primary importance, especially regarding molecular cooling. The huge importance of that cooling process on the dynamics of collapsing proto-structures cannot be underestimated since the evolution of primordial fluctuations depends on the capability of the primordial gas to cool down. It is an absolute necessity, therefore, to take this cooling process into account when trying to determine how small the first cosmological objects were. H<sub>2</sub> and HD cooling have been studied in many works [2]. Their role played in the mechanism of condensation or fragmentation in collapsing proto clouds is crucial, particularly on the formation of primordial stars. In this PCMI session we plan to consider these questions with an overview “State of Art” in different domains such as molecular chemistry, molecular cooling capabilities, collapse with molecules, lines of emissivity during the Dark Ages period of the Universe (Period between the cosmological recombination of hydrogen and the formation of the first gravitational structures) and discuss some outlooks relative to possible detections.

## Références

[1] Galli and Palla, *Ann. Rev. Astron. Astrophys.*, 51, 163 (2013)

[2] M. C. Coppola et al., *Astrophys. Journal. Suppl. Series.* 199, 16 (2012)