Comet:
- remnants of **icy planetesimals** formed in the solar nebula 4.6 Gyrs ago

Components:
- **icy** components: $\text{H}_2\text{O}$, CO, CO$_2$, NH$_3$, etc.
- **dust** components: Si, Mg, Fe, Na, etc.

→ Cometary ices have kept **past information in the solar system**
Ortho-to-para abundance ratios (OPRs) of NH$_2$ in comets: The meaning of OPRs of cometary volatiles

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 observational results for comets

A nuclear spin temperature is one of interpretations of OPR
However, laboratory experiments demonstrated fast ortho-para conversion in solid-phase water

Nitrogen isotopic ratios of NH$_2$ and CN in comet C/2013 US10 (Catalina) by HDS/Subaru

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