# Experimental report

08/10/2016

**Proposal:** 8-04-756 **Council:** 4/2015

**Title:** Self-organisation of RNA in salty environment

**Research area:** Biology

**This proposal is a new proposal**


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**Samples:** NH4Cl:AMP and ND4Cl:AMP

| Instrument | Requested days | Allocated days | From | To |
|---|---|---|---|---|
| IN13 | 13 | 8 | 10/09/2015 | 18/09/2015 |
| IN5 | 4 | 4 | 22/10/2015 | 26/10/2015 |
| D16 | 6 | 7 | 08/09/2015 | 15/09/2015 |
| IN16B | 5 | 0 | | |


## Abstract:

RNA displays a diversity of properties. A limitation to progress is that RNA can only be synthesized in small quantities using specific enzymes and costly substrates. A recent discovery is that guided polymerization in anhydrous environments such as lipid multilayers or ammonium chloride salt crystals, can promote a non-enzymatic reaction in which oligomers of single stranded ribonucleic acids are synthesized from ordinary mononucleotides such as AMP. The observation is also highly relevant for origin of Life studies of how nucleic acids first assembled and then were incorporated into the earliest forms of cellular life. The presence of ammonium salt environment as an organizing matrix markedly enhanced the yield of polymeric products more than ten-fold over the amounts observed with lipid-enhanced reactions, presumably because the matrix serves to concentrate and organize the mononucleotides as well as allowing a degree of diffusional mobility required for extensive polymerization. The proposal is to characterize AMP/NH4Cl structures and dynamics on D16 and IN13, IN5, IN16B with the aim of furthering our understanding of the RNA synthesis. The work is part of Laura Da Silva.

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We used neutron scattering to investigate 5'-adenosine monophosphate (AMP) molecules organized by ammonium sulfate crystals.

Structures were characterized by diffraction on D16, and corresponding dynamics measured as a function of hydration on IN13, IN16B and IN5 to cover a timescale in the pico to nanosecond range. Several experimental difficulties were encountered and data analysis and evaluation are still under way.