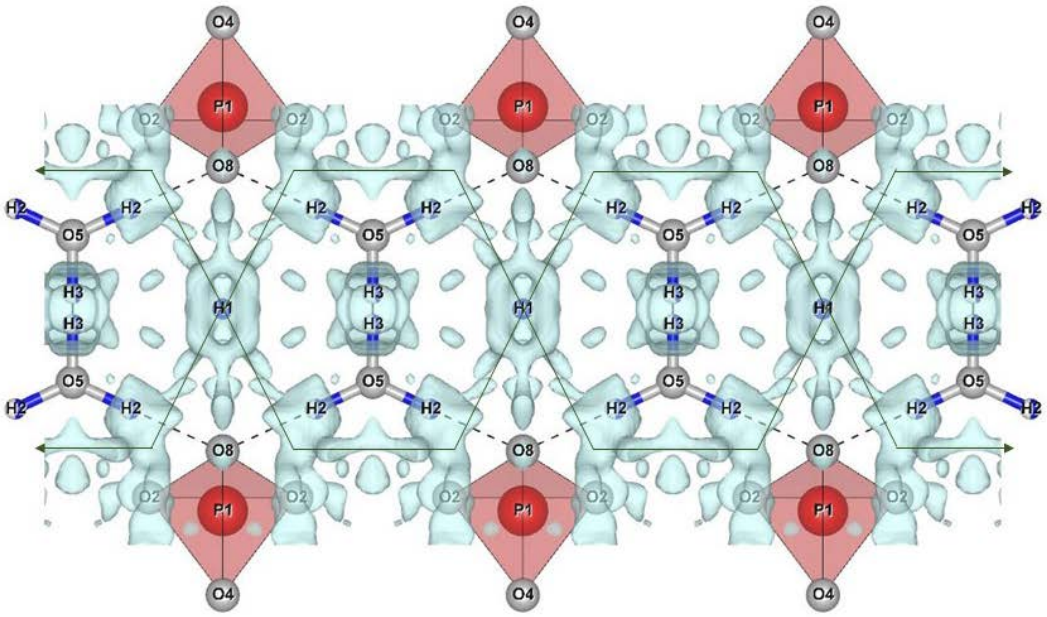
Structure-related properties of minerals

e.g. ionic conductors & multiferroics

It is fortune to have the great diversity of minerals which are economically-ecologically friendly natural resources. For instances - like perovskite, spinel, and olivine, many of oxide mineral groups serve as fundamental matrices for (multi)ferroelectrics, magnetic-optical devices and electrochemical active materials in batteries and fuel cells. Their stable topologies allow to be readily synthesized and modified in order to obtain/improve material properties targeted. In this concern, it is worth searching and re-searching for further prototype structures among other mineral groups to develop advanced materials in the postmodern industrial use.

My talk at the Friday seminar on Sep 20. 2019 is about 1) phosphatic oxyhydroxide minerals as protonic conductors; 2) double 6er-ring silicates as combined Li-Na ionic conductors; 3) reconsideration of $MnWO_4$-type multiferroics. These new findings are based on results from structure analyses using neutron and X-ray diffraction data, combined with those from thermal and chemical analyses, magnetic and dielectric measurements, and quasi-elastic neutron scattering.



Neutron scattering length density distribution of protons at 393 K around the hydrogen bond network HB-I (dashed line) obtained by the Maximum-Entropy Method at an isosurface level of -0.05 fm/Å^3. The route highly possible for a long-range order dynamic of protons is across HB-I over H1 sites, as highlighted in solid green lines.