Proposal for a session at IMA 2022

Title: Symmetry breaking in minerals

Convenors:

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Symmetry is one of the fundamental characteristics of a mineral. But the symmetry of minerals can be broken or reduced by many different processes. Structural phase transitions in minerals give rise to many important phenomena including magnetism and ferro-electricity (symmetry breaking by ordering of magnetic moments and electric polarisation respectively). Cation ordering can break symmetry and be used as a geothermometer or geospeedometer. The symmetry of minerals can also be broken without phase transitions, for example by surface relaxations or the application of deviatoric stress, and can give rise to useful chemical and physical properties.

On the 100th anniversary of the discovery of ferro-electricity we invite contributions on all aspects of symmetry breaking in minerals at all scales, the methods to detect it including diffraction and spectroscopies, and the consequences of symmetry breaking and how it can be used.

Note to program committee:

2021 marks the 100th anniversary of the discovery of ferroelectricity. It would therefore be appropriate to mark this occasion with a conference plenary speaker on the subject. We propose Prof Nicola Spaldin (ETH Zurich and Fellow of the Royal Society), a world leader in multi-feroics, to talk about ferroic behaviour in minerals. She has just written a very accessible article on the history of ferroics in the newsletter of the International Union of Crystallography:
https://www.iucr.org/news/newsletter/etc/articles?issue=151819&result_138339_result_page=8

In addition to a conference plenary speaker, we also plan to invite one speaker to our session. Possible candidates include Prof Mike Glazer (Oxford) on phase transitions in perovskites and Prof Michael Carpenter on the role of elasticity in phase transitions.