

## Single Crystal Studies of the Incommensurate Composite Structure of Rb-IV

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A number of elements have recently been shown to have a composite incommensurate high pressure phase. This phase has a so called 'host-guest' structure type comprising a tetragonal 'host' framework with channels along the fourfold  $c$  axis. Within these channels are 1D chains of atoms that form a 'guest' structure that is incommensurate with the host. We have observed host-guest structures in the alkali and alkaline-earth metals Rb, Sr, Ba, and in the group Va elements Bi, Sb and As [1]. Among these elements Rb is unique in having a 16-atom host structure, and transition to a disordered phase comprising liquid-like guest chains [2].

The 1D guest chains in Rb-IV are more than  $7\text{\AA}$  apart [3], and this raises the question as to the nature of the host-chain and chain-chain interactions in the ordered phase, and how this interaction weakens or vanishes at the transition to the disordered phase. The strength of the host-chain interaction can be inferred from the intensity of the  $hklm$  modulation reflections. Although these extremely weak reflections could not be detected with the powder techniques used previously to determine the structure of Rb-IV [3], they should be detectable using single crystal methods. In this talk I will present new results on the full modulated structure of Rb-IV using x-ray diffraction data collected from high quality single crystals of Rb-IV at  $\sim 18\text{GPa}$ .

[1] McMahon M.I., Nelmes R.J., *Z. Kristallogr.*, 2004, **219**, 742-748. [2] McMahon M.I., Nelmes R.J., *Phys. Rev. Lett.*, 2004, **93** (5), 055501. [3] McMahon M.I., Rekhi S., Nelmes R.J., *Phys. Rev. Lett.*, 2001, **87** (5), 055501.

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