# High temperature structural study of decagonal Al-Cu-Rh quasicrystal

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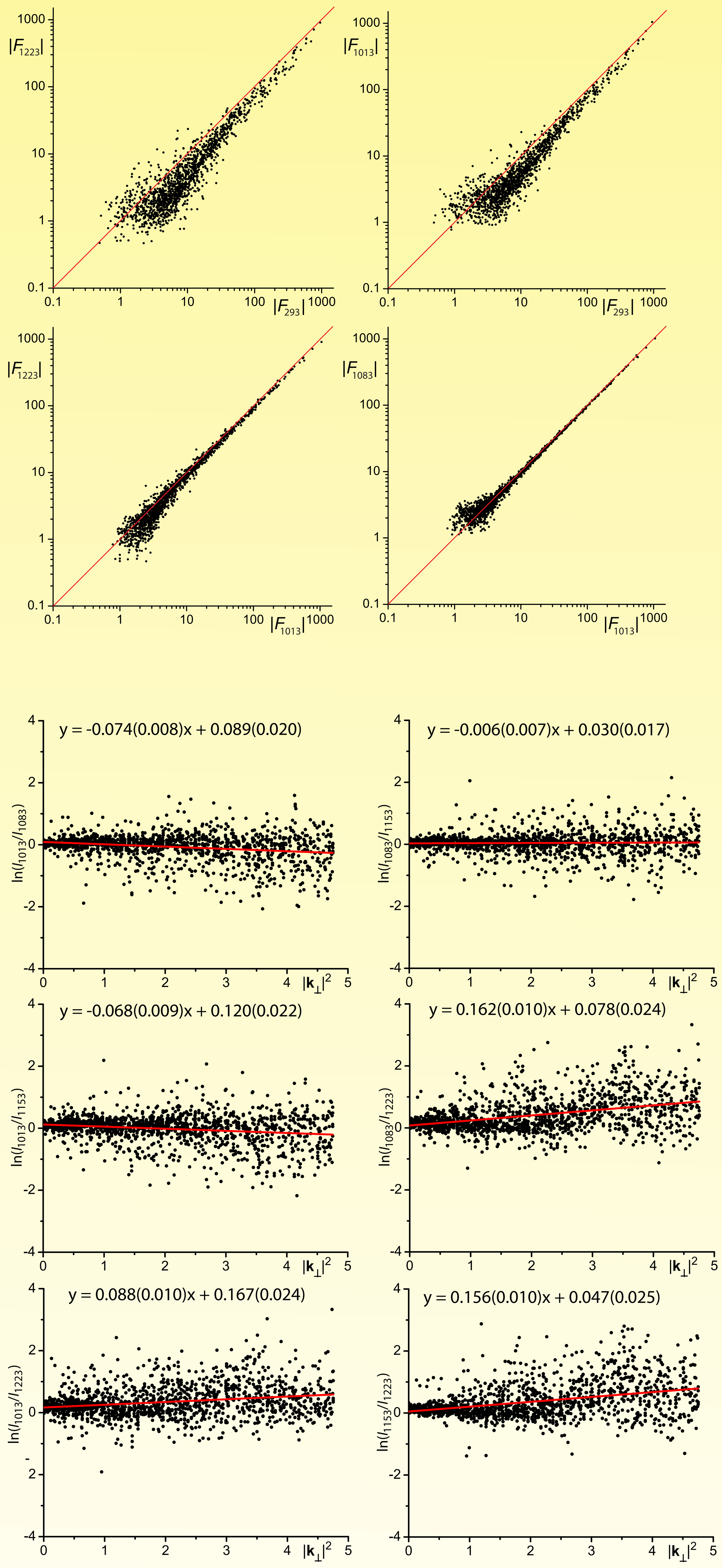
Open question:
**Why are quasicrystals stable?**

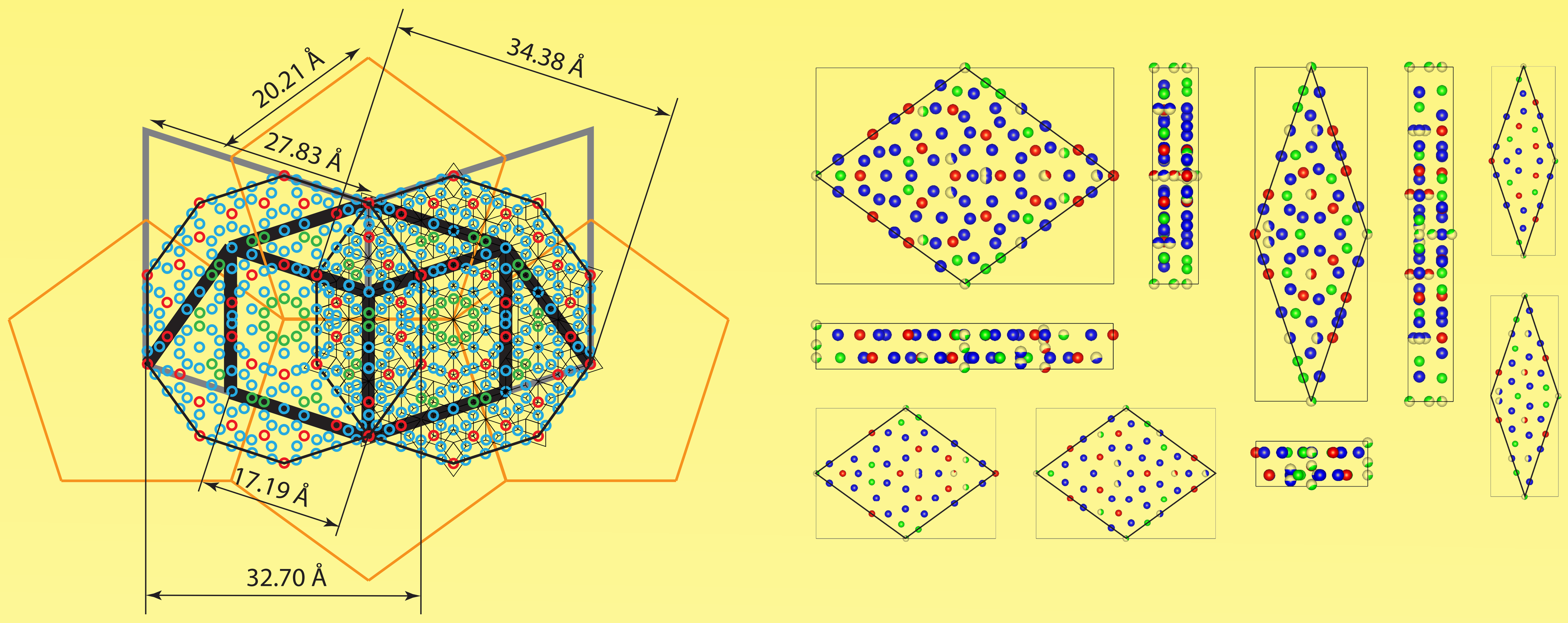
Possible scenarios:
**“Energy stabilisation”**
- A quasiperiodic structure could be stable at 0 K

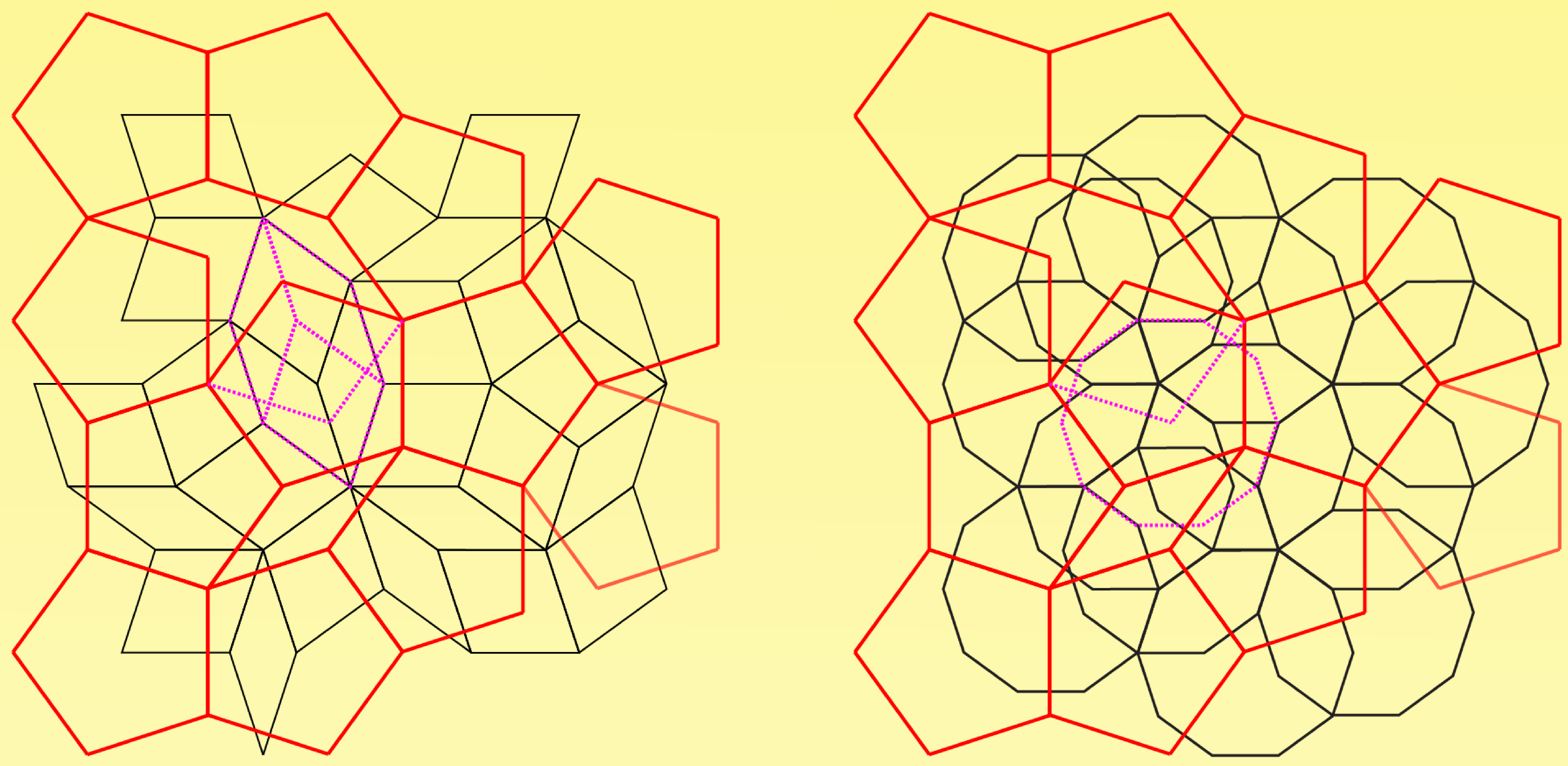
**“Entropy stabilisation”**
-Quasicrystals are are high-temperature phases.
-What are the sources the “stabilising entropy”?

## Diffraction data

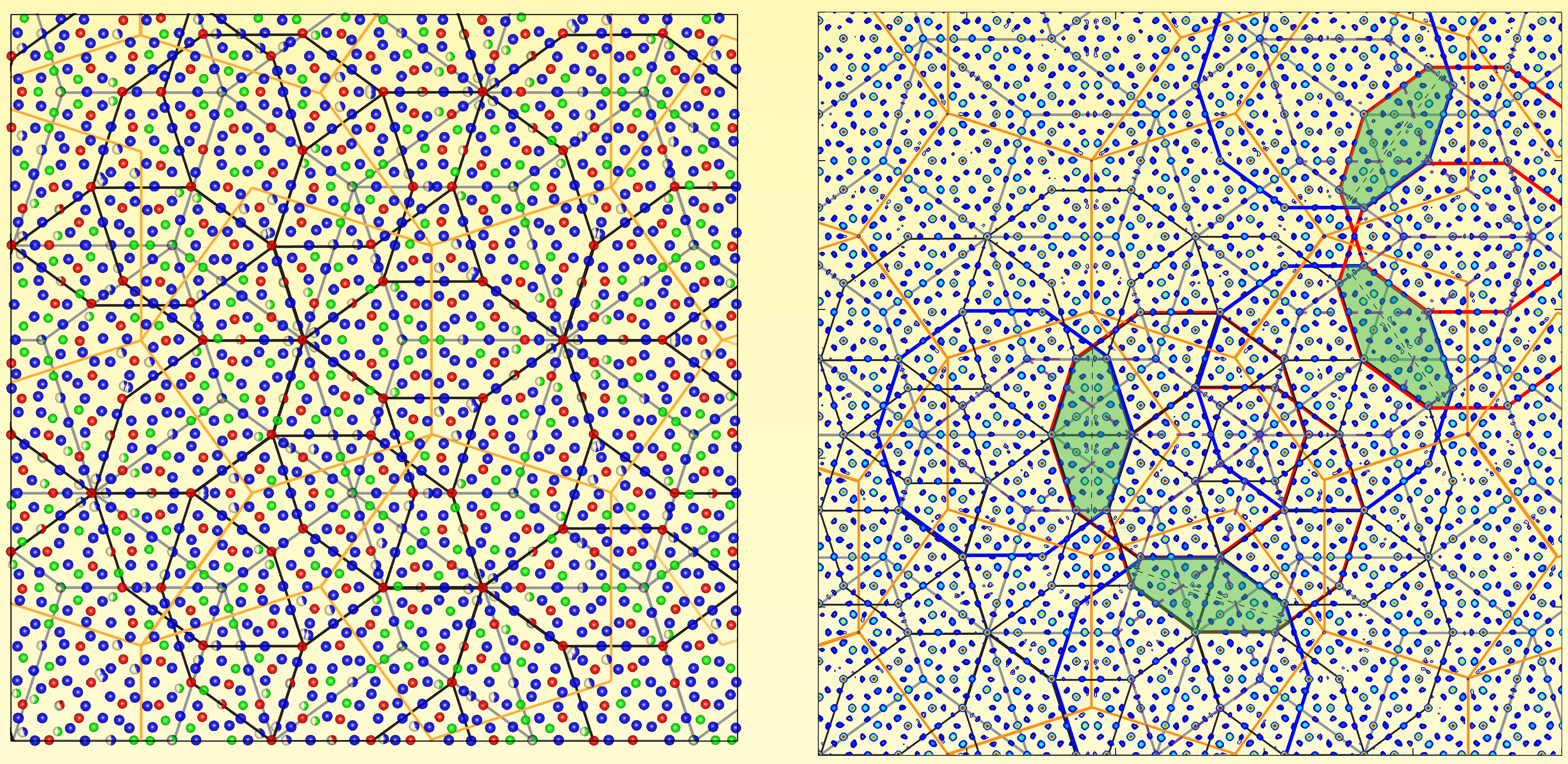



## Structure building principles

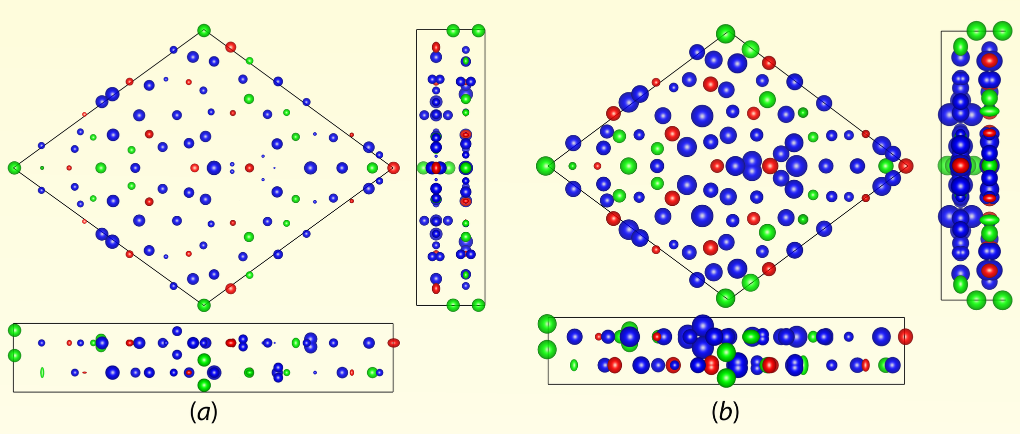


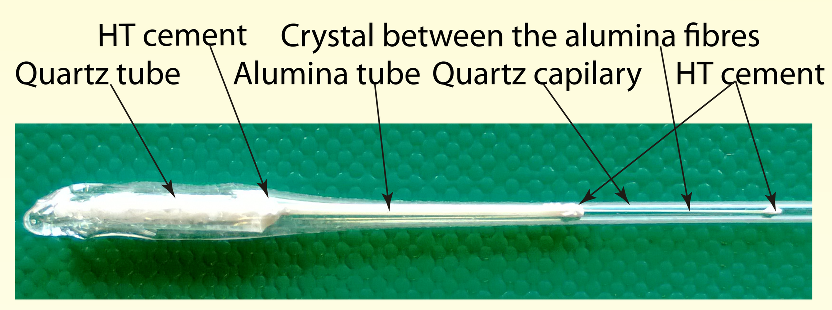
## Typical results



## Temperature influence




## Sample holder




## Conclusions

- The structures at all temperatures are essentially the same.
- The phasonic ADPs are practically the same at all temperatures.
- The $\ln(I_{T2}/I_{T1})$ vs. $|\mathbf{k}_{perp}|^2$ plots indicate that the best on-average quasiperiodic order should exist between 810 °C - 880 °C.
- The bets ordered structure could have the least number of “flipped”cluster positions.
- A “classical” phasonic-entropy-based stabilization mechanism would imply an increase of the on-average quasiperiodic order with temperature. Why would the 950 °C structure be less ordered?
- **We suspect, that QCs could be “normal” HT phases. In terms of stabilization mechanism, they could be not different from other HT complex intermetallic phases.**

## Literature

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