THE REASON FOR SMOOTHNESS

If space really has a discrete atomic structure, then it is extraordinarily improbable that it would have the completely smooth and regular arrangement we observe it to have.

Lee Smolin (2001)

The most appealing aspect of loop quantum gravity is that it predicts that space is not infinitely divisible, but that it has a granular structure.

Carlo Rovelli (2003)

Another day of me and my computer, taps and clicks and coffee breaks. It kicks off with a note from me to me to follow up a quote from Smolin: When he says 'extraordinarily improbable' it's an alert. Clue-type problem's what I hear. So today I'm looking for the clue. It's hard to find. Searches using 'smooth' find other stuff.

But I can see it's not just Smolin. Many physicists say space is quantized. Or, as Smolin says, it has an atomic structure. If so, there's a smallest piece of space, a piece that cannot be divided, inside which nothing penetrates.

A smallest piece of space should solve at least one problem on my list: the zeroes and infinities. But as Smolin says it spawns another: how the pieces fit together. Observations show that the result is very smooth. At the smallest scale, space pieces must fit neatly and this neatness must extend in exact fashion everywhere. How could a single structure spread across the vastness of the universe? Smolin's point is not just that the fit must be exact. It's not just that they must line up like atoms in a perfect crystal, though he says this too. It's that right across the universe—in places that know nothing of each other—they must line up the same way. It's a bit like the Horizon Problem. It comes down to the speed of light. If no message can go faster, how do far-flung parts of space discern the structure they must have?

Frank doesn't need the answer. His issue isn't how the smoothness spreads. But it should get him thinking. Given that the smoothness spreads, how does this begin? Could it be that it begins at the Beginning? Questions like these speak detective language. The mere fact they exist should tell him that something's afoot.