In Heidelberg

In the morning, Heinrich was scheduled to take a taxi across the river and up the hill to the Max-Planck-Institut for his first encounter with a Lithuanian astrophysicist called Lukas Pavlis, whom he was told would be the best to offer him some introductory information.

When he arrived, he was ushered into a small office and sat opposite a tall young man who asked him what he knew about science.

‘Nothing,’ Heinrich said. ‘I am a novelist.’

Lukas nodded drily, ironically.

‘What do you want to know?’ he asked.

‘Let’s begin with the hard parts. Tell me something about infinity and eternity,’ Heinrich smiled.

‘I am not sure they are the hard parts. Take infinity, for example,’ Lukas said, smiling in return. ‘There is an infinity of numbers. Numbers don’t end. If you count, there is no end to your counting, and the implication of that is that there is no end to anything.’

‘Do things not end in space? I mean, eventually?’

‘It doesn’t make much of a difference. Perhaps space has no boundary. Space and time are inseparable so your question about things ending in space would really not, in any case, be the best question to ask,’ he said.

Heinrich was unsure what the phrase ‘space and time are inseparable’ meant.

‘Can I ask you to explain time and space?’ Heinrich asked.

‘In astronomy, we don’t see things as they are now. There is always a distance in time. We are not looking at space, but looking also at time, or space as time.’

Heinrich nodded. He thought for a split second that he had got the meaning but only as he might get the meaning of a line of poetry, a meaning which would not then survive much subsequent rational scrutiny.

‘The galaxy is not a place,’ Lukas continued. ‘It is, by definition, the sum of its parts. Galaxies are moving away from each other very quickly. The universe is expanding. A lot of space is very empty.’

‘What is there in this emptiness?’ Heinrich asked.

‘We really have to discuss or define dark matter and dark energy before we go much further.’

‘Oh yes, dark matter,’ Heinrich whispered. ‘Let’s start with that.’

‘Dark matter is like matter,’ Lukas said. ‘It has gravity. But it is not like rock, or dust. It is not normal matter. It is not made up of photons or neutrons. It is made up of exotic particles. It does not emit light and remains unseen.’

‘Are you sure it is there?’

‘Yes, we can even map it.’

‘Map it?’

‘Yes, we know where it is, and where it is not, because it exerts gravity. But we don’t know what it is composed of. Its presence is inferred indirectly from its effect on the motions of visible stars and by the light-bending that it causes. It has to be there.’

Heinrich was almost prepared to say that this was once how people spoke of God. But, busy now taking notes, he stopped himself.

‘And dark energy?’ he asked.

‘Yes, we need to define that too. But it is more mysterious, more elusive. It may be what is causing the galaxies to move away from each other. But we do not know what it is, and we cannot measure it, or map it.’

‘Why is it “dark”?’

‘There is a good reason why it is called dark. Because if it was light we could see it.’

‘We can’t see it?’

‘No. We can’t map it either, or measure it.’

‘Why do we think it is there then, if that is not too obvious a question?’

‘Gravity pulls in. There must be something that pushes out. We could call dark energy a repulsive force. We presume it is there. We can observe its

effects. Maybe something is wrong with our knowledge of particles. Perhaps we will know in the future.'

'Would it make more sense for me to be here if I were a painter rather than a novelist?'

He had expected the question to puzzle Lukas, but it did not.

'Yes, of course,' he said confidently. 'A painter can explore and suggest, connect or leave an image of a line hanging or a colour blurred or intensified. I cannot draw dark energy. But an artist, maybe a visual artist, could dream it up in a way that I could not. And an artist works with inference and intuition more intensely than I do.'

'You like abstract art?'

'Nothing is abstract. Painting, no matter what, is made of material. It is not that an artist might map dark matter or dark energy, but rather that these dark things might map their way onto a canvas or paper as hints and clues, knots and coils, as intangibles, as patterns, as a game between what is random and what is ordered, as a way of offering things more power and pulse because they are unknowable but also ominously or even vividly present.'

'But painting is not science.'

'Who is to say that a flat canvas with marks on it might not be a portrait of sound? Or that the depth of a colour might make time and space apparent, or harder to chart, than ever words could?'

For a second Heinrich had a sharp memory of being in a gallery in Dublin a few months earlier. A friend had recommended a visit to Graphic Studio Gallery in the city centre, but it was hard at first to find, being in a tiny lane off a side street behind an imposing modern building. The artist was Mark Francis, whose work his friend had seen in Austria. Heinrich was interested in the amount of vivid life the artist had captured in the printing process. But what he wanted to say now to Lukas was that Mark Francis's prints were poetic, mysterious, but also rigorous and precise. Some work took its bearings from musical notation or a graph of sound from a recording studio, but other work seemed to explore the very essence of atoms and the inner shape of dark matter. What fascinated Heinrich was how the colours and shapes and textures drew him in, and kept him in a state that mixed reverie and strangeness as though this state was something complete in itself, as though this was enough. The prints spelled nothing out. What mattered in each work was its own dynamic, its own dense inner life. He wondered if this was something that might help him understand what Lukas was talking about, but then he remembered that he was here to ask questions.

'Tell me about the universe,' he said, having realized that maybe simple requests like this would yield better answers than questions that attempted to sound intelligent.

'Our universe can be explained by postulating a beginning, an early phase,' Lukas said.

'You mean the Big Bang?'

'That is the term we use,' Lukas said drily, factually.

‘What did the Big Bang come from?’

‘Nothing.’

‘OK, let me put it like this. This is what puzzled me from the little I tried to read before I came here: What was there before the Big Bang?’

‘What was before the Big Bang is an illegitimate question,’ Lukas said softly. He managed not to sound patronizing.

Heinrich wondered if being an astrophysicist involved having a strange emotional intelligence, a sort of natural, effortless charm, that was almost irritating, and then not. He could not understand how Lukas was managing to make him feel at ease while also making him feel that he was fully at a loss.

‘The universe found itself,’ Lukas went on, ‘when it was the size of an atom. Space was expanding. There was heat and then a cooling off, and the rest we can …’ He shrugged as though the rest were somehow obvious. He stopped and glanced out of the window.

Heinrich was tempted to enquire if Lukas were checking if the universe in question were still there.

‘Let’s go back to before the Big Bang,’ Heinrich suggested, laughing nervously.

‘There is no before. Before the Big Bang there is no time.’

‘What do you mean by that?’ He felt like a journalist on television trying to ask a politician hard and meaningful questions.

‘I mean that time is the path of light from A to B. Before the Big Bang there was no A or B. If there is no distance there is no time.’

‘And the Big Bang itself?’

‘We have a picture of its early phase. The conditions for the universe to come into being, or an early version of the universe, happened in less than one minute.’

‘What happened?’

‘A heating up and then a cooling. And that created one minute, or less than one minute, in which the universe, or its early phase, could come into being.’

Heinrich was tempted to ask if God could have been behind all of this, if the time before the Big Bang, so unmeasurable and unmentionable, could be the time when God held sway. But in a hallowed place like this where science reigned, he would be quickly dismissed, he knew, if he raised the question of God.

Instead, he thought he might ask Lukas to talk some more about painting. Or tell him about his visit to Dublin.

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