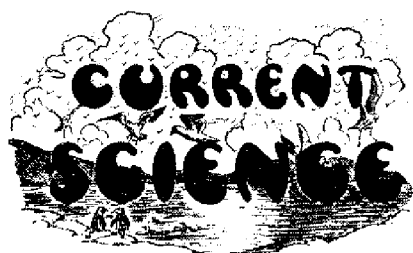


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Sir James Jeans and the New Physics

The Presidential Address of Sir James Jeans before the British Association is a fascinating piece of work. Most of it is taken up with a presentation of those aspects of modern physics which have influenced modern scientific outlook – as envisaged by Jeans. In the first place, he makes a clear-cut distinction between the methods of the classical physicist and of his modern successor. The former was keen on trying to construct a mental picture whose elements were derived from objects of every-day experience such as ‘billiard balls, jellies and spinning tops’. It is because of this tendency on the part of the ‘old-fashioned’ physicist to visualise a concrete model in his explanation of phenomena, that classical theories or modifications of such theories on classical lines could not be made to embrace the new facts of observation. According to Jeans, the changed outlook of the modern physicist consists in the following: The content of a set of physical measurements is a set of numbers, each number being a ratio. For instance, to take an example given by Jeans, when we say that the wavelength of a certain radiation is so many centimetres we mean that it is a certain multiple of a centimetre, and since we do not

know or rather can never know what a centimetre is in itself, the significant fact in the statement ‘so many centimetres’ is only its numerical part. Once we concede this, it naturally follows that our theoretical picture of the phenomenal world, which consists in synthesising measured data must be mathematical in form.

The solid rock on which the modern physicist builds is ascertained fact and the bricks used in the construction are the ‘observables’. For instance, in the wave theory of light, the solid fact is represented by the word ‘wave’, and the ether with which the classical physicist filled space, space itself and time, are man-made decorations and do not form part of nature. The same is the lot of the space-time continuum of the theory of relativity, for the General Theory shows that it ‘can be crumpled and twisted and warped as much as we please without becoming one whit less true to nature – which of course can only mean that it is not itself part of nature’. The entire knowledge of the outer world comes to our minds through the frame-work of space and time and their product the space-time continuum, as it affects the senses. However important the frame-works may be, they do not form part of nature but are purely mental constructs. The same is the fate of matter. It is as much a pure assumption as ether and is an ‘unobservable’. Classical Physics was based on the hypothesis that matter existed in space and that its history was mechanistically determined for all time, time being independent and objective. The cardinal weakness in this outlook of the classical physicist was that the role given to the mind was that of a passive onlooker without any influence on what it observed. According to Jeans, what the modern physicist has set before himself is the task of studying the impressions that

he gets through ‘the gateways of knowledge’ (i.e. the senses) and not what lies beyond. He is concerned with appearance rather than with reality.

In fact, no satisfactory answer to the fundamental difficulty which one encounters in all forms of extreme subjective idealism, has yet been offered by any philosopher; neither does modern Physics indicate a satisfactory way of meeting it. To Sankara, the famous Indian philosopher, both our perceptions and the things perceived are illusory appearances spread over an unchanging underlying reality. Our perceptions have no higher degree of reality than the things perceived. So in his system the idea that all persons see the same objects in the mind and therefore is itself illusory.

‘The old physics,’ says Jeans, ‘imagined it was studying an objective nature which had its own existence independently of the mind which perceived it which indeed had existed from all eternity whether it was perceived or not.’ One would infer from this that there is no objective world existing independently of the perceiving mind. How different from this attitude is the view of Max Planck – one of the most prominent among the makers of modern physics! Says Planck: “A science that starts off by predicting the denial of objectivity has already passed sentence on itself.” According to Planck, one of the fundamental theorems of physical science is that there is a real world which exists independently of our act of knowing. So the reader of Jeans’ fascinating address must not forget that there are prominent physicists who differ fundamentally from him on the philosophical implications of the revolutionary changes that have taken place in the domain of Physical Science.