McGILL UNIVERSITY
MONTREAL

THE MACDONALD PHYSICS LABORATORY

1930 Mar. 11.

F. L. Troyer, Esq.
Toronto,

Dear Mr Troyer

Herewith copies of an outline of what I propose doing on the 18th I hope this is the sort of thing you wanted.

I shall bring with me two or three copies of the abstract of my lecture in case the reporters wish for it at the close of the meeting.

Yours sincerely,

A. Vibert Douglas.

Jeans and Eddington.

James Hopwood Jeans and Arthur Stanley Eddington are two of the most outstanding men of science of our day and generation.

Both of them were born in England, Jeans in London in 1877 and Eddington in Kendal in 1882. Both became Wranglers in the Cambridge Tripos and were elected to Fellowships in Trinity College after becoming winners of the Smith's Prize. Both men have distinguished themselves in mathematical researches in physics and astrophysics while Jeans as a cosmologist and Eddington as a Relativist and Philosopher, have won world-wide recognition and profoundly influenced modern thought. Both are Fellows of the Royal Society and are past-presidents of the Royal Astronomical Society.

Jeans lectured in applied mathematics at Cambridge and at Princeton and published his Dynamical Theory of Gases and his Electricity and Magnetism before 1912. The theoretical researches of Poincare, Roche and Sir George Darwin captured his interest with the result that he carried the investigation of the equilibrium forms of rotating bodies a stage further than the earlier workers had done and applied the "pear-shaped fission theory" to the formation of binary stars; the "equatorial emission theory" to the formation of a star galaxy or spiral nebula; and he carefully investigated the "tidal disruption theory" of the formation of the Solar System.

Jeans attacked the problem of the age of the stars from three different approaches and concluded that all the evidence pointed to an age of ten million-million years. He has studied and speculated upon the internal physical state of the stars, the source of their radiant energy and the course of evolution both for an individual star and for the Universe as a whole.

Eddington was Chief Assistant at Greenwich for several years prior to 1913 when he was appointed Plumian Professor of Astronomy at Cambridge University. His first well known work was on star streaming. Next came his realisation of the important part played by radiation pressure in the equilibrium of a star - this gave for the first time a logical explanation of the observed facts about the small range in values of the masses of

the stars as contrasted with the very great range in their luminosities. Since 1916 Eddington has produced one important paper after another dealing with the Internal Constitution of the stars. In 1924 he found a relation between the mass and luminosity of a star which has had far reaching consequences, and over this and other points he has waged almost uninterrupted warfare with his critics Jeans and more recently Milne. As Professor Eddington has humorously remarked - onlookers will feel sure that some corpse is stretched upon the ground but the disputants will disagree as to whose corpse it is!

Remarkable confirmations were made within the last ten years at Mt. Wilson Observatory of predictions that had been made by Eddington from purely theoretical considerations regarding the immense size of stars like Betelgeuse, about 300 times the diameter of the sun; and the very great density of a star like the dwarf companion of Sirius - more than one ton per cubic inch.

As an exponent of the Relativity Theories, Eddington ranks first amongst British writers. But he has also been a contributor to these theories, his "world-building" with mathematical symbols starting from the least possible number of assumptions, and arriving at a map or graph of the universe containing the relations of mass, momentum, stress, gravitation and electromagnetic phenomena places him with Einstein, Weyl and De Sitter as amongst the foremost constructive mathematical thinkers of the age.

As a philosopher, Eddington is Platonic in his insistence upon the intrinsic part played by mind in the picture of the Universe which man constructs for himself. He stresses the purely symbolic character of the world built up by the measurements of the physicist. The underlying reality is untouched by these methods of approach. Einstein, Weyl, and De Sitter attempt to produce models of the universe, Eddington labels the result of his world-building as merely a map or graph of the actual world. We can put "symbolic" knowledge, the result of physical measurements, into this map, but "intimate" knowledge, the essential contribution of the mind, cannot be introduced. With regard to atomicity and the Indeterminacy principle, he believes that here we are touching the most fundamental aspects of the physical world, in contrast to the laws of conservation of energy, gravitation, and so on- laws which are not primary but are of the nature of identities inevitably true because of the way in which man, as man, sees and interprets the world about him.

Being a Quaker with sincere mystical insight, Eddington lays great stress on the reality of the unseen world. His philosophical approach as a scientific man

gazing at the question is through "intimate" knowledge, with its dependence upon Mind, and through man's consciousness of the passage of time - the sense of "becoming" - and consideration of the significance of the word "ought", a word having no meaning as applied to the purely physical world where what an atom or a star does and what it ought to do are always one and the same thing. The essence of Eddington's attitude of mind may be found in these passages from his own writings:-

"Scientific investigation does not lead to knowledge of the intrinsic nature of things.....We are dealing in physics with a symbolic world..... The measure numbers which are all that we glean from a physical survey of the world, cannot be the whole world... We all know that there are regions of the human spirit untrammelled by the world of physics..... Life would be stunted and narrow if we could feel no significance in the world around us beyond that which can be weighed and measured with the tools of the physicist or described by the metrical symbols of the mathematician..... You will understand the true spirit neither of science nor of religion unless seeking is placed in the forefront.... Our belief is not that all the knowledge of the universe that we hold so enthusiastically will survive in the letter; but a sureness that we are on the road."

123 Keewatin Avenue,
Toronto 12, Canada,

March 10th, 1930.

Dr. A. Vibert Douglas,
Physics Building,
McGill University,
Montreal, P.Q.

Dear Miss Douglas;

In view of the fact that your lecture on "Jeans and Eddington," to be given before the Toronto Meeting of the Royal Astronomical Society of Canada, next week, will probably be of great popular interest, I should like to obtain an advance summary or abstract which could be turned over the the local press a few days before the lecture, preferably next Saturday.

Increasing public interest in cosmogony is shown by the large circulation of recent books on the subject, notably Jeans' "Eos" and "The Universe Around Us."

If you could arrange to send me an abstract copy, I would thoroughly appreciate your kindness.

Truly yours,

Fred L. Troyer.
(Member, Toronto Council, R.A.S.C.)