Seiler Strasse 29,
Hamburg. Jan 23. 1895.

16/62

Dear Sir

Many thanks for your letter, which is very acceptable, and encouraging. The "amendment" you propose to my suggestion seems to imply a more gradual accumulation of energy previous to the explosion of the star than the passage in my letter expressed. My idea was I think that the whole phenomenon was more sudden; that the corpuscules at a certain stage of compression (of star) would begin to stick, that this sticking would itself be a cause for additional sticking, by the sort of dam created: and just as a dam opposed to a stream, raises the waters and so ensures its own destruction, so the corpuscules* sticking in the compressed star, would, by the obstruction created, precipitate an explosion very quickly: since the corpuscules move with at least the velocity of light. When the star explodes or "dissociates" (perhaps not so clearly kept in view before), as I see clearly now, energy must be generated: otherwise there could be no work done, beyond the mere communication of motion to the receding fragments of the star. Your view or supplementary suggestion seems to imply a slower procedure, as in terms of your letter

"That all the time that the star was growing beyond a certain size, the gravitational energy that it had acquired (into space was being stored up inside it by the stoppage of the corpuscules". Then follows disruption of star.

This seems to imply a difference in degree as to our points of view, rather than a difference in kind? Your view may be the more correct, as it is decidedly the more precise.

I may mention having already returned on Saturday last, a corrected proof of a note on this subject to be added to my paper in the Phil. Mag., worded in such general terms as probably to serve its purpose(?) As you may be possibly interested in seeing the note, I venture to enclose a copy (or rather I will transcribe the passage in question here) viz:—

"It might be suggested that overgrown stars may towards their centres, become from excessive compression of their elastic molecules, inadequately penetrable by the streams of atoms; and so the overgrown masses be broken up by conversion of the etherial motion into heat:— excessive aggregation becoming thus itself a condition for producing disintegration." (passage from proof, transcribed).

In the Phil. Mag. August 1879; also Sitzungsberichte, Akad. Vienna, April 1883, I may mention having developed a theory of the universe viewed as a gas in equilibrium of temperature: and the present suggestion about separation of material of overgrown stars, would constitute, as it seems, the missing link wanted to complete that theory.

The idea of course is (to use an imaginative simile) that a thermometer imagined on proportional scale, diminished* as a multiple of the mean stellar distances, would indicate in the universe the same temperature anywhere: just as an ordinary thermometer placed in a gas, shows in any region the same reading: while

actually the (ordinary) gas consists of numbers of small bodies, glowing and dark, at all varieties of* temperature, moving about.

It appears then that as a test of temperature equilibrium, the universe must be reckoned by units of volume, as a gas is, and not by isolated masses.

The "dissociation" of a star (occasional, then overgrown or "useless") becomes then somewhat analogous to the occasional dissociation of a molecule of an ordinary gas in its normal state, or when in equilibrium of temperature. This would doubtless be understood however, without mentioning it.

Yours very truly
S. Tolver Preston

P.S. Unequal pressure at the core of a star might obviously generate rotation, which by centrifugal tendency, might accelerate the disruption of the mass. The "spiral forms" of some nebulae might be what one could expect under premisses of such dynamical kind — not to pursue this further.

11/62

Prof. G. F. Fitzgerald FRS

Foot Note * The temperature of a gas is manifestly in great proportion made up of the internal motions, vibrations etc of the molecule: and to them alone the waves observed to be generated in the ether are due (as need scarcely be mentioned).