

the whole structural configuration of the universe, lends a peculiar charm to those investigations which relate to the distances of the fixed stars.

Human ingenuity has invented for this class of investigations methods totally different from the usual ones, and which, being based on the *velocity of light*, deserve a brief mention in this place. Savary, whose early death proved such a loss to the physical sciences, had pointed out how the aberration of light in double stars might be used for determining the parallaxes. If, for instance, the plane of the orbit which the secondary star describes around the central body is not at right angles to the line of vision from the earth to the double star, but coincides nearly with this line of vision itself, then the secondary star in its orbit will likewise appear to describe nearly a straight line, and the points in that portion of its orbit which is turned toward the earth will all be nearer to the observer than the corresponding points of the second half, which is turned away from the earth. Such a division into two halves produces not a real, but an apparent unequal velocity, with which the satellite in its orbit recedes from, or approaches, the observer. If the semi-diameter of this orbit were so great that light would require several days or weeks to traverse it, then the time of the half revolution through its more remote side will prove to be longer than the time in the side turned toward the observer. The sum of the two unequal times will always be equal to the *true* periodic time; for the inequalities caused by the *velocity of light* reciprocally destroy each other. From these relations of duration, it is possible, according to Savary's ingenious method of changing days and parts of days into a standard of length (on the assumption that light traverses 14,356 millions of geographical miles in twenty-four hours), to arrive at the absolute magnitude of a semi-diameter of the earth's orbit, and the distance of the central body and its parallax may be then deduced from a simple determination of the angle under which the radius appears to the observer.*

In the same way that the determination of the parallaxes instructs us as to the distances of a small number of the fixed stars, and as to the place which is to be assigned to them in the regions of space, so the knowledge of the measure and duration of proper motion, that is to say, of the changes which take place in the positions of self-luminous stars, throws some

* Savary, in the *Connaissance des Temps pour 1830*, p. 56-69, and p. 163-171; and Struve, *ibid.*, v. clxiv.