A Demonſtration concerning the Motion of Light, *communicated from* Paris, *in the* Journal des Scavans, *and here made Engliſh.*

PHiloſophers have been labouring for many years to decide by ſome Experience, whether the action of Light be conveyed in an inſtance to diſtant places, or whether it requireth time. M. *Romer* of the *R. Academy* of the Sciences hath deviſed a way, taken from the Obſervations of the firſt Satellit of *Jupiter*, by which he demonſtrates, that for the diſtance of about 3000 leagues, ſuch as is very near the bigneſs of the Diameter of the Earth, Light needs not one ſecond of time.

Let (in *Fig.* 11.) A be the *Sun*, B *Jupiter*, C the firſt Satellit of *Jupiter*, which enters into the ſhadow of *Jupiter*, to come out of it at D; and let EFGHKL be the *Earth* placed at divers diſtances from *Jupiter*.

Now, ſuppoſe the *Earth*, being in L towards the ſecond Quadrature of *Jupiter*, hath ſeen the firſt Satellit at the time of its emerſion or iſſuing out of the ſhadow in D; and that about $42\frac{1}{2}$ hours after, (*vid.* after one revolution of this Satellit,) the *Earth* being in K, do ſee it returned in D; it is manifeſt, that if the Light require time to traverſe the interval LK, the Satellit will be ſeen returned later in D, than it would have been if the Earth had remained in L, ſo that the revolution of this Satellit being thus obſerved by the Emerſions, will be retarded by ſo much time, as the Light ſhall have taken in paſſing from L to K, and that, on the contrary, in the other Quadrature FG, where the *Earth* by approaching goes to meet the Light, the revolutions of the Immerſions will appear to be ſhortned by ſo much, as thoſe of the Emerſions had appeared to be lengthned. And becauſe in $42\frac{1}{2}$ hours, which this Satellit very near takes to make one revolution, the diſtance between the *Earth* and *Jupiter* in both the Quadratures varies at leaſt 210 Diameters of the *Earth*, it follows, that if for the account of every Diameter of the *Earth* there were required a ſecond of time, the Light would take $3\frac{1}{2}$ minutes for each of the intervals GF, KL; which would cauſe near half a quarter of an hour between two revolutions of the firſt Satellit, one obſerved in FG, and the other in KL, whereas there is not obſerved any ſenſible difference.

Yet

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Yet doth it not follow hence, that Light demands no time. For, after M. *Romer* had examin'd the thing more nearly, he found, that what was not ſenſible in two revolutions, became very conſiderable in many being taken together, and that, for example, forty revolutions obſerved on the ſide F, might be ſenſibly ſhorter, than forty others obſerved in any place of the Zodiack where *Jupiter* may be met with; and that in proportion of twenty two for the whole interval of H E, which is the double of the interval that is from hence to the Sun.

The neceſſity of this new Equation of the retardment of Light, is eſtabliſhed by all the obſervations that have been made in the *R. Academy*, and in the *Obſervatory*, for the ſpace of eight years, and it hath been lately confirmed by the Emerſion of the firſt Satellit obſerved at *Paris* the *9th* of *November* laſt at 5 a Clock, 35'. 45". at Night, 10 minutes later than it was to be expected, by deducing it from thoſe that had been obſerved in the Month of *Auguſt*, when the *Earth* was much nearer to *Jupiter*: Which M. *Romer* had predicted to the ſaid Academy from the beginning of *September*.

But to remove all doubt, that this inequality is cauſed by the retardment of the Light, he demonſtrates, that it cannot come from any excentricity, or any other cauſe of thoſe that are commonly alledged to explicate the irregularities of the *Moon* and the other Planets; though he be well aware, that the firſt Satellit of *Jupiter* was excentrick, and that, beſides, his revolutions were advanced or retarded according as *Jupiter* did approach to or recede from the Sun, as alſo that the revolutions of the *primum mobile* were unequal; yet ſaith he, theſe three laſt cauſes of inequality do not hinder the firſt from being manifeſt.

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Fig. II.

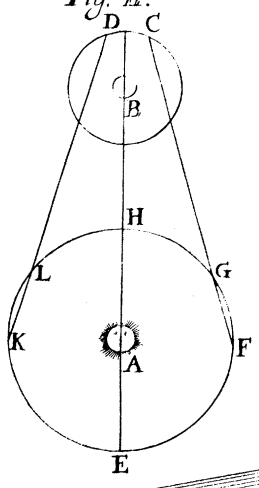

Fig. I.

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