

the latter is situated somewhat to the westward. This observation has been confirmed—partly by micrometrical measurements—by Harding, Struve,* John Herschel, and South. The small differences in the degree of eccentricity, appearing periodically, which result from the corresponding observations of Schwabe, Harding, and De Vico in Rome, are perhaps consequences of oscillations of the center of gravity of the ring about the geometrical center of Saturn. It is surprising that, so early as the end of the seventeenth century, a priest of Avignon, named Gallet, attempted unsuccessfully to direct the attention of astronomers to the eccentric position of Saturn.† With the extremely minute density of Saturn (perhaps scarcely $\frac{3}{5}$ the density of water) and its decrease toward the surface, it is difficult to form a conception of the *molecular condition* or *material* constitution of the body of the planet, or even to decide whether this constitution actually presupposes fluidity, *i. e.*, mobility of the smallest particles, or solidity, according to the frequently adduced analogies of pine wood, pumice-stone, cork, or a *solidified liquid*—ice. Horner, the astronomer of the Krusenstern expedition, calls the ring of Saturn a train of clouds; he maintains that the mountains of Saturn consist of masses of vapor.‡ Conjectural astronomy exercises here an unrestricted and tolerated play. Of an entirely different nature are the serious speculations of two distinguished American astronomers, Bond and Peirce, as to the possible *stability* of Saturn's rings, founded upon observations and the analytical calculus.§ Both agree

* Compare Harding's *Kleine Ephemeriden* for 1835, p. 100; and Struve, in Schumacher's *Astr. Nachr.*, No. 139, p. 389.

† In the *Actis Eruditorum pro anno 1684*, p. 424, is an extract from the *Systema Phenomenorum Saturni*, autore Galletio, proposito eccl. Avenionensis: "Nonnunquam corpus Saturni non exacte annuli medium obtinere visum fuit. Hinc evenit, ut, quum planeta orientalis est, centrum ejus extremitati orientali annuli propius videatur, et major pars ab occidentali latere sit cum ampliore obscuritate." "Sometimes the mass of Saturn appeared not to reach *exactly the middle of his ring*. Hence it happens that when that planet is in the east, his center appears nearer to the eastern extremity of the ring, and the greater part is away from the western side with greater obscurity."

‡ Horner, in Gehlen's *Neuem Physik. Wörterb.*, bd. viii., 1836, p. 174.

§ Benjamin Peirce, *On the Constitution of Saturn's Ring*, in Gould's *Astron. Journal*, 1851, vol. ii., p. 16. "The ring consists of a stream or of streams of a fluid, rather denser than water, flowing round the primary." Compare also Silliman's *Amer. Journal*, ser. ii., vol. xii., 1851, p. 99; and with regard to the superficial inequalities of the ring, as well as disturbing and consequently *preserving* influences of the *satellites*. Sir John Herschel, *Outlines*, p. 320.