

Close-in exoplanets, but none of ours. Guidance from Triton's orbit and the physics of gravitation

Miles F Osmaston, The White Cottage, Sendmarsh, Ripley Woking, Surrey GU23 6JT, UK :
miles@osmaston.demon.co.uk

Some 23% of all orbitally-determined exoplanets orbit their star within 12 R_{sun} , with a clear concentration centred on 10 R_{sun} . The proportion has changed little as numbers grew. Not a matter of detectability but of why they are there at all (Mercury is at 83).

Triton's retrograde orbit invites a reconsideration of the main mechanism of planetary construction. Its immersion in the (56 body) prograde satellite population of the Giant Planets implies [1] that tidal capture had been the mechanism of central body accretion until the arrival of their gas-ice envelopes liquefied their interiors, destroying their tidal attribute and halting Triton's inward motion. Efficient tidal capture required nebular gas-drag during planetary growth, confirmed by the preserved low eccentricities of all except Mercury (so it alone suffered a late giant impact).

The second problem of planetary construction, of long standing [2], is to equip their growth materials with their very high (orbitally prescribed) specific angular momenta relative to that of their rotating star/Sun. Nebular action is the only conceivable agent for doing this. New insight on the physical mechanism of gravitation [3] leads to the expectation that the Newtonian field of any gravity-retained assemblage is inescapably accompanied by a radial Gravity-Electric (G-E) field, providing a potentially over-riding repulsive force on sufficiently charged nebular ions. The tangential velocity pattern is then not Keplerian and we show that, in the solar system example, outward G-E field action yields an adequate a.m. growth mechanism within the frame of our new scenario for planetary system formation [3]. Its key feature is that solar/stellar passage through a second cloud gathers cold protoplanetary material whose high opacity permits protoplanetary nuclei to form very close to the star and then be pushed out successively in a G-E driven nebular disc wind, growing by tidal capture of passing objects.

Apparently we see close-in exoplanets soon after their star has left the high-opacity second cloud, exposing them to us and to their star. Now, with no disc wind to drive them outward, they accumulate in number until they vanish by evaporation.

[1] McCord TB. (1968) *JGR* **73**, 1497:- Counselman CC., III. (1973) *Ap.J.* **180**, 307.

[2] Jeans JH. (1919) *Adams Prize Essay*, Clarendon Press. 293 pp.

[3] Osmaston MF. (2006) *GCA* **70**(18S), A465:- — (2009a) *EPSC Abstr.* **4**, EPSC2009-264:- — (2009b) *Geophys.Res. Abstr.* **11**, EGU2009-12204:- — (2010) In *JENAM 2010* (ed. A. Moitinho et al) Abstract Book (Version 2.0) 159-160.

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