

Abstract Submitted
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Pathologies of van Stockum dust/Tipler's time machine DAVID LINDSAY, None — We describe external vacuum solutions for radial cutoff of “van Stockum dust”, an infinitely long rotating matter solution of Einstein's equations of general relativity. These poorly explored spacetimes have been known for decades, but it seems that they have never been investigated in detail. They exhibit a number of exotic properties, which we described more fully in *General Relativity and Gravitation* (2016 48:121). Exotic properties include circular “time travel” in cylindrical shells alternating with shells permitting no time travel; there are infinitely many such shells. With sufficiently massive rotating columns, these shells get closer and closer together as one gets farther from the rotation axis. Also, a separate set of infinitely many cylindrical shells exists, having what might be termed “extreme frame-dragging”, within which revolution is possible only in one direction; they alternate with “normal” shells allowing motion in either direction. Gravitational attraction and tides increase with distance from the matter column, and diverge at the “edge of the universe,” which is only a finite distance away - although its circumference is infinite; and its boundary is a circle, not a cylinder.

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None

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