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New Aspects of Angular Momentum Quantization in Curved Geometries FELIX T. SMITH, SRI International — Curvature in velocity space affects angular momentum through the Thomas precession, observable through quantum effects. When position space is curved too, a similar angular momentum effect arises, with an even smaller curvature parameter. In a phase space view of dynamics and group theory the two effects appear through a direct product of two Lorentz groups, one centered on Lorentz boosts and the other on translations in a hyperbolic position space. The usual tensor representation must now be extended to 8×8 matrices arising from position and velocity submatrices. The rotation subgroup becomes a direct product group $R(3)_{\mathrm{vel}} \otimes R(3)_{\mathrm{pos}}$. Its matrices recouple into a total angular momentum of standard form and a new contra-angular momentum Q represented by 6×6 matrices whose Lie algebra and quantization properties have been derived (Smith, F. T., Ann. Fond. L. de Broglie, **30**, 179 (2010)). It has quantum numbers q, m_q whose connections with elementary particles are as yet undetermined. Transitions will be highly forbidden except in regions of high gravitational curvature or high relative velocity.

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