1145-83-1115 **Carla Cederbaum*** (cederbaum@math.uni-tuebingen.de). *Static, equipotential photon surfaces have no hair.*

The Schwarzschild spacetime is well-known to possess a unique "photon sphere" – meaning a cylindrical, timelike hypersurface P such that any null geodesic initially tangent to P remains tangent to P – in all dimensions. We will show that it also possesses a rich family of spatially spherically symmetric "photon surfaces" – general timelike hypersurfaces P such that any null geodesic initially tangent to P remains tangent to P. This generalizes a result of Foertsch, Hasse, and Perlick from $2+1$ to higher dimensions.

Moreover, we investigate the existence and properties of photon surfaces in a large class of static, spherically symmetric spacetimes. We show that they are (almost) necessarily rotationally symmetric.

We will also present a general theorem that implies that any static, vacuum, asymptotically flat spacetime possessing a so-called "equipotential" photon surface must already be the Schwarzschild spacetime. The proof of the theorem uses and extends Riemannian geometry arguments first introduced by Bunting and Masood-ul-Alam in their proof of static black hole uniqueness. It holds in all dimensions $n+1 \geq 3+1$.

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