RECENT MATHEMATICAL ADVANCEMENTS IN HOLOGRAPHY

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We consider a plane wave, a radiation solution, and the sum of these solutions (total solution) for the Helmholtz equation in an exterior region in R^3. For a ray in this region whose direction is different from the propagation direction of the plane wave, we show that the restriction of the radiation solution to this ray is uniquely determined by the intensity of the total solution on an interval of this ray. As a corollary, we also prove that the restriction of the radiation solution to any plane in the exterior region is uniquely determined by the intensity of the total solution on an open domain in this plane. In particular, these results solve one of the old mathematical questions in holography.
Further results, including applications to phaseless inverse scattering, will be also presented.

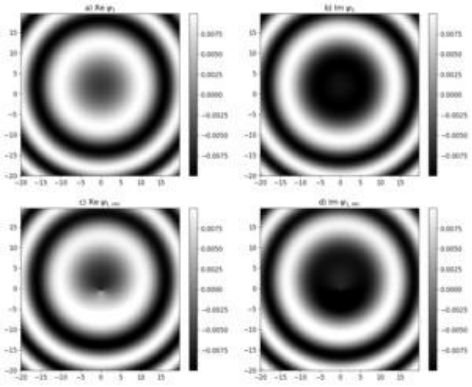

Fig. 1: Exact real and imaginary parts of a radiation solution restricted to a plane (first line) and their holographic reconstruction (second line)

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