INVERSE BOUNDARY VALUE PROBLEMS IN THE HOROSPHERE

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We consider a boundary value problem for the Schrödinger operator $-\Delta+q(x)$ in a ball $\Omega : (x_1+R)^2+x_2^2+(x_3-r)^2 < r^2$, whose boundary we regard as a horosphere in the hyperbolic space $\mathbf{H}^3$ realized in the upper half space. Let $S = \{|x| = R, x_3 > 0\}$ be a hemisphere, which is generated by a family of geodesics in $\mathbf{H}^3$. By imposing a suitable boundary condition on $\partial\Omega$ in terms of a pseudo-differential operator, we compute the integral mean of $q(x)$ over $S \cap \Omega$ from the local knowledge of the associated (generalized) Neumann-to-Dirichlet map for $-\Delta + q(x)$ around $S \cap \partial\Omega$. The potential $q(x)$ is then reconstructed by virtue of the inverse Radon transform on the hyperbolic space. This justifies the well-known Barber-Brown algorithm in the electrical impedance tomography.