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**Sigurdur Helgason\*** ([helgason@mit.edu](mailto:helgason@mit.edu)), 5 Benton Road, Belmont, MA 02478. *Orbital Integrals, applications and problems.*

On a Lorentzian manifold  $G/H$  of constant curvature  $K$  and dimension  $2m$  we proved in 1959 an inversion formula for the  $H$ -orbital integrals. In continuation of this, Schlichtkrull and Schimmimig deduced that each operator  $L - K(2m - k)(k - 1)$  ( $k = 3, 5, \dots, 2m - 1$ ,  $L$  the Laplacian) satisfies Huygens' principle. In an important paper (Springer Lect. Notes 1243) J.Orloff extended the above inversion formula to a non Riemannian symmetric space  $G/H$  of rank one. Under additional assumptions, similar conclusions follow for the Laplacian  $L + \text{constant}$ . On a Euclidean space the spherical average operator is well known to satisfy the Darboux Equation. We extend this to  $H$ -orbital integrals on the rank one space  $D/H$  mentioned above. We shall also discuss in special cases the relationship of the Plancherel formula for  $G$  and  $G/H$  to  $H$ -orbital integrals. (Received September 14, 2011)