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**François Monard\*** (fmonard@ucsc.edu), McHenry 4126, UC Santa Cruz Math Department, 1156 High St., Santa Cruz, CA 95064, and **Gabriel P Paternain**. *The geodesic X-ray transform with a  $GL(n, \mathbb{C})$  connection on simple surfaces.*

We will discuss recent results regarding the injectivity and inversion of geodesic X-ray transforms with connections, defined on certain Riemannian surfaces with boundary. Such a problem arises for instance as the linearization of the inverse problem of reconstructing a connection from knowledge of its parallel transport along geodesics (in short, its "scattering data"). It also arises in medical imaging applications, in the context of attenuated x-ray transforms where the attenuation term depends linearly on the tangent vector.

While prior literature tackled the case of injectivity for unitary connections, the present case tackles inversion for general, non-unitary ones. The starting point is the derivation of Fredholm inversion formulas, obtained by studying certain transport equations on the unit tangent bundle. The error operators involved are then explicit enough, that further properties can be inferred on the injectivity of such equations (and as a result, of the transform itself) for almost all connections, including a significant drop in regularity requirements. Numerical examples will be presented. (Received July 30, 2017)