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Unitarization of the Horocyclic Radon Transform on Symmetric Spaces and on Homogeneous Trees.

We consider the Radon transform for a dual pair (X, Ξ) , where $X = G/K$ is a noncompact symmetric space and Ξ is the space of horocycles of X . We address the unitarization problem that was considered by Helgason, namely the determination of a pseudo-differential operator such that the pre-composition with the Radon transform extends to a unitary operator $\mathcal{Q}: L^2(X) \rightarrow L_b^2(\Xi)$, where $L_b^2(\Xi)$ is a closed subspace of $L^2(\Xi)$ which accounts for the Weyl symmetries. Furthermore, we show that the unitary extension intertwines the quasi-regular representations of G on $L^2(X)$ and $L_b^2(\Xi)$. Finally, following the work in the continuous setup, we construct the unitarization of the horocyclic Radon transform on a homogeneous tree T and we show that it intertwines the quasi regular representations of the group of isometries of T on the tree itself and on the space of horocycles. (Received January 25, 2022)