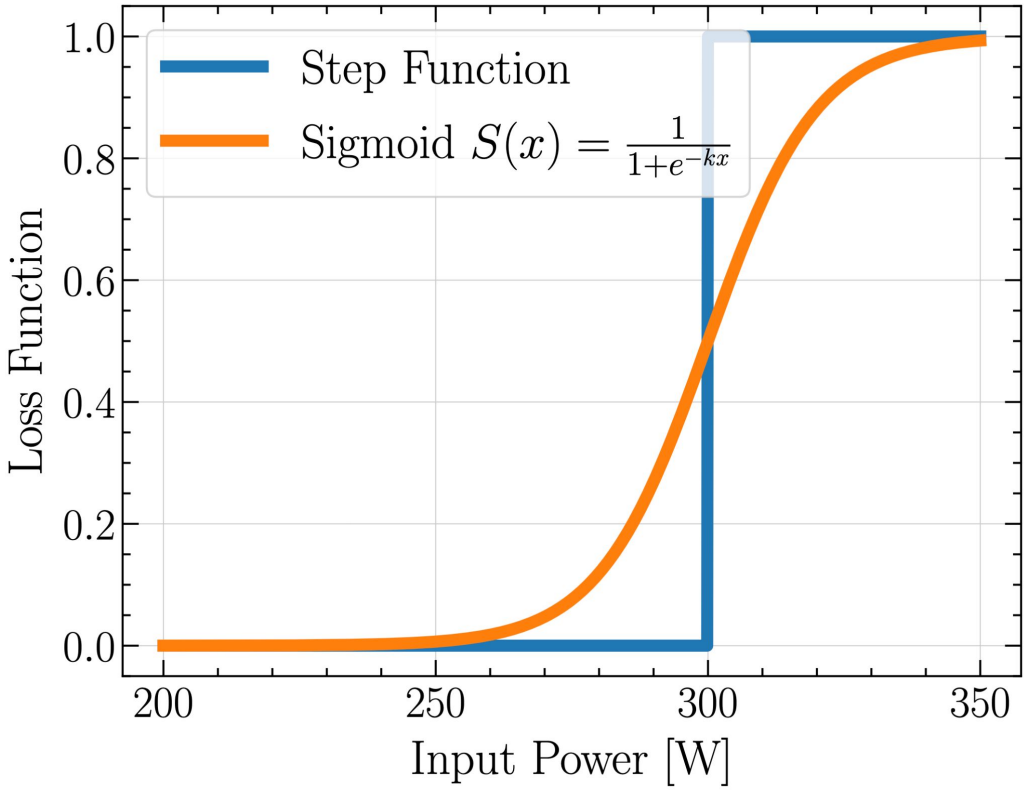
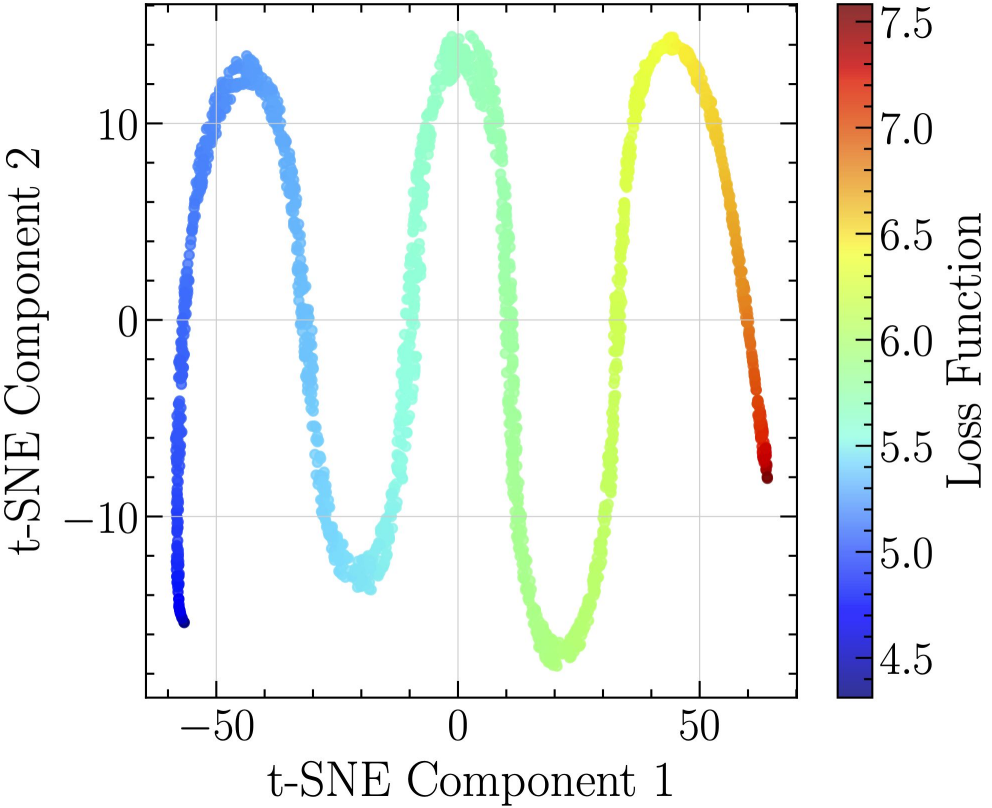
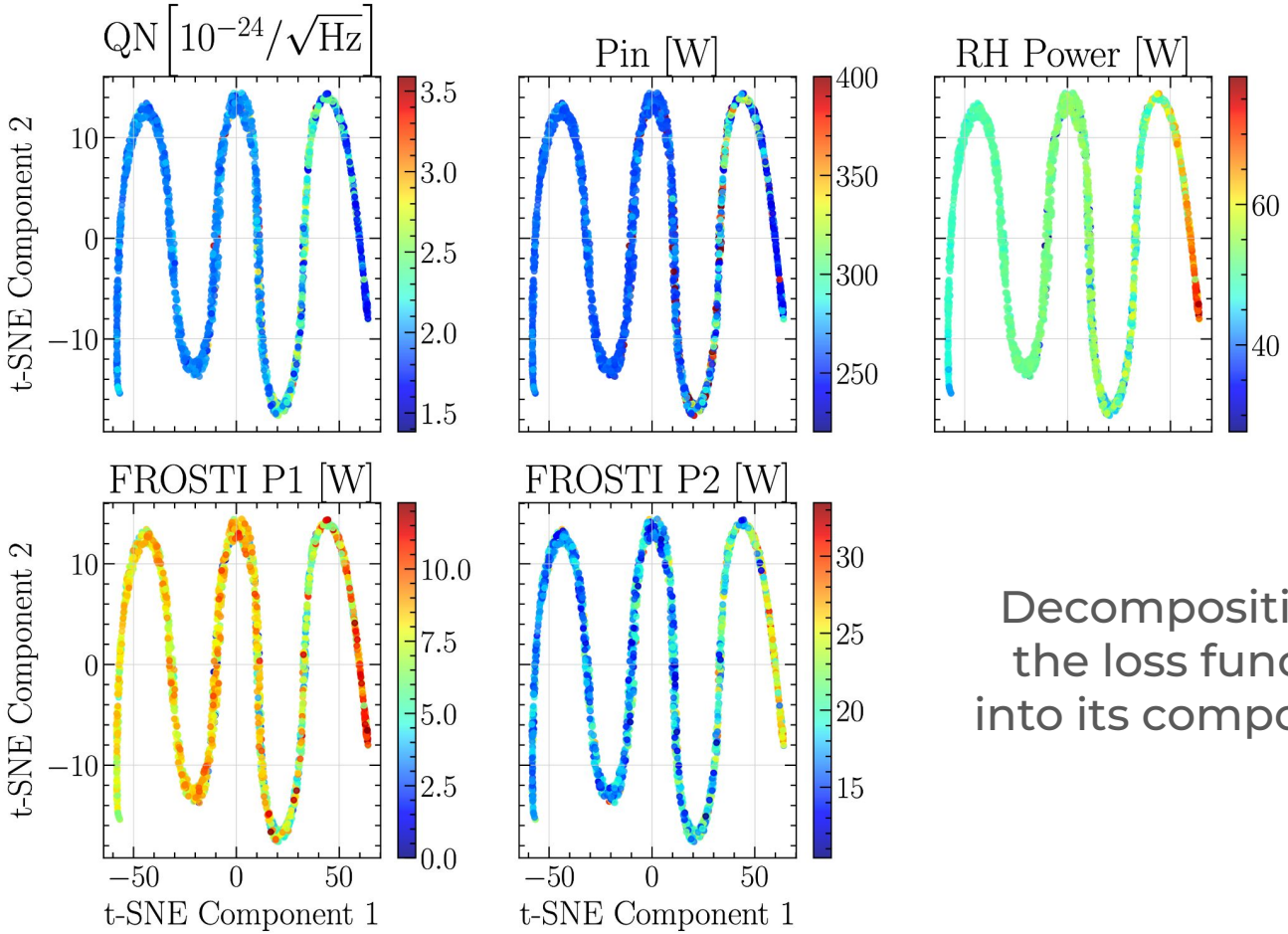
Dimensionality Reduction with Smooth Loss Function



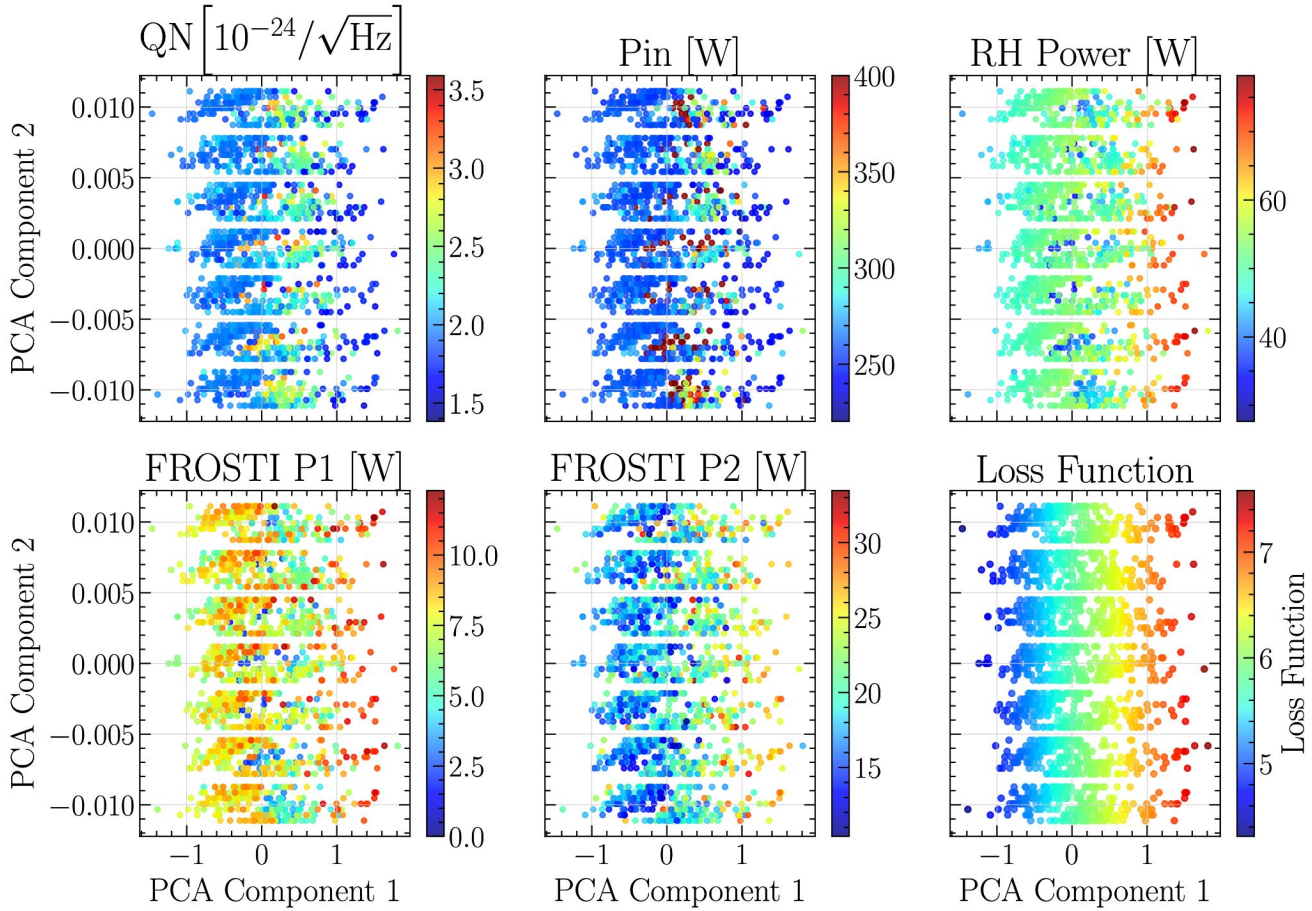
1. **Loss function: QN + S(Pin) + S(PRH) + S(P1) + S(P2)**
2. Use the Sigmoid function to smooth out the loss function
3. Still have the slope (k) and the relative weight factors free to vary.



1. Loss function in the reduced t-SNE 2D space.
2. Large loss and small loss regions are spatially separated.
3. The loss landscape is more continuous than before.
4. Visualization



Decomposition of the loss function into its components



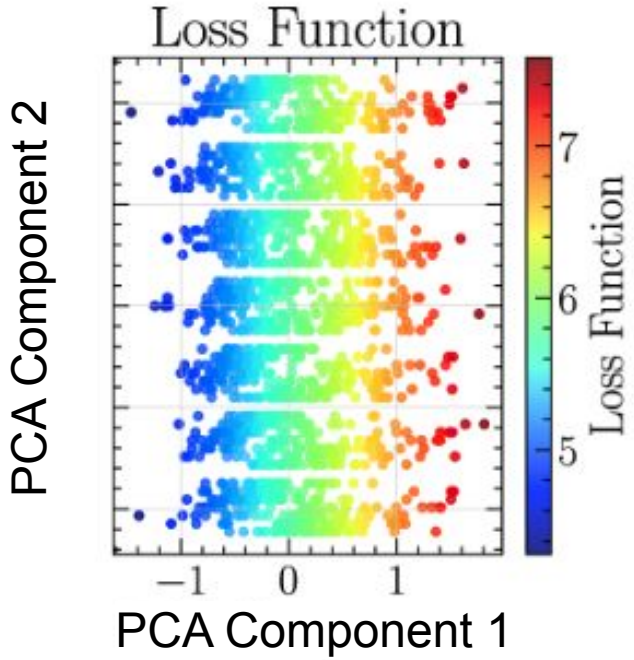
1. Use Principal Component Analysis (PCA) instead. This is linear and simpler than t-SNE.
2. Still see a good separation of large and small loss regions along the first component
3. Though unclear behavior in the second component

PCA Component 1:

0.99999*L - 0.0021885*r1 + 0.000262327*r2 - 0.00381379*w1 - 9.26225e-5*w2 - 5.77253

PCA Component 2:

8.70466e-14*L + 0.119014*r1 + 0.992893*r2 + 9.0514e-13*w1 - 7.37587e-13*w2 - 0.157265



PCA component 2 does not depend on the loss L, only combination of the r1, w1, r2, w2. This explains the discrete binning structure.