Traditional Approaches - Challenges
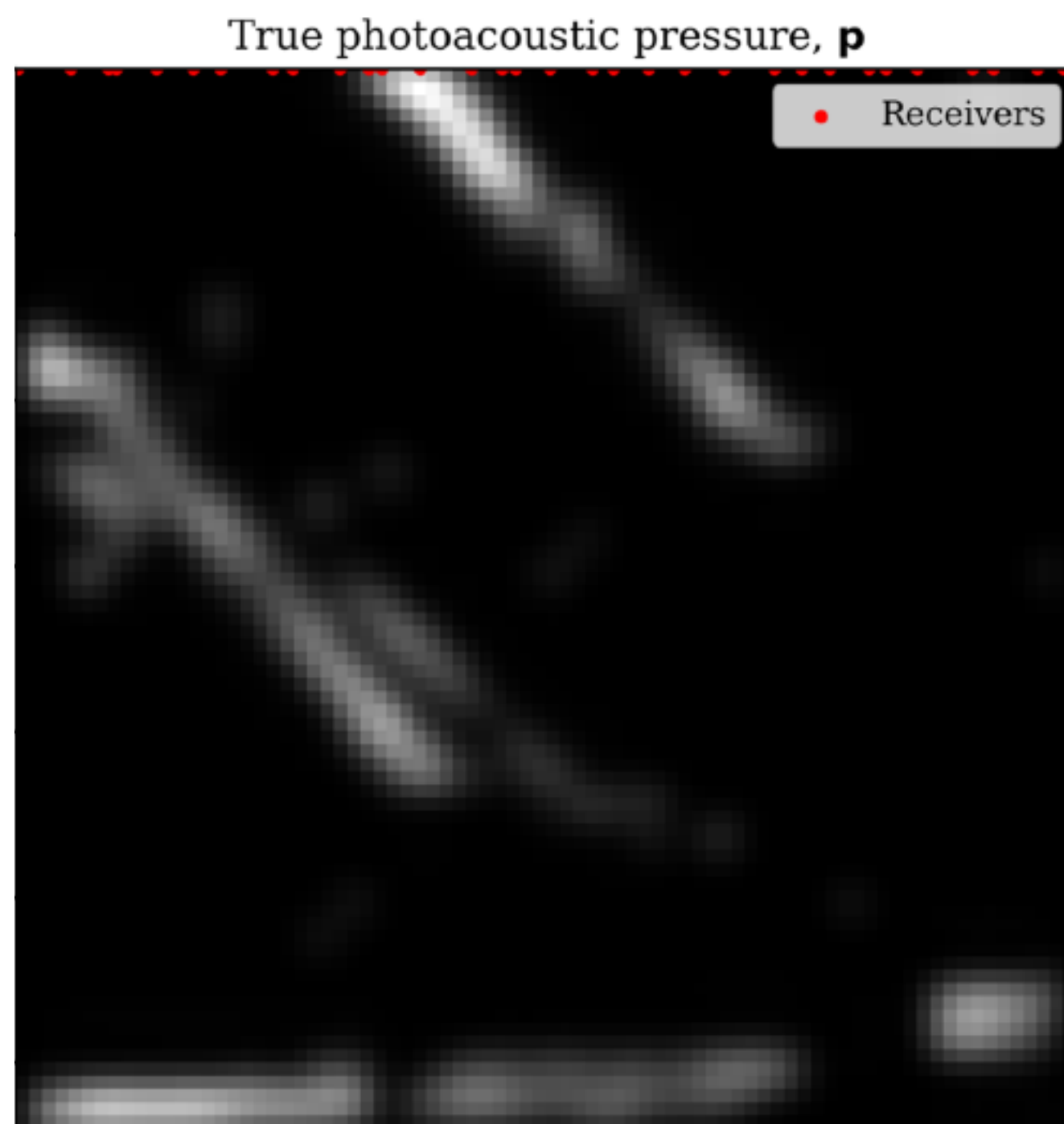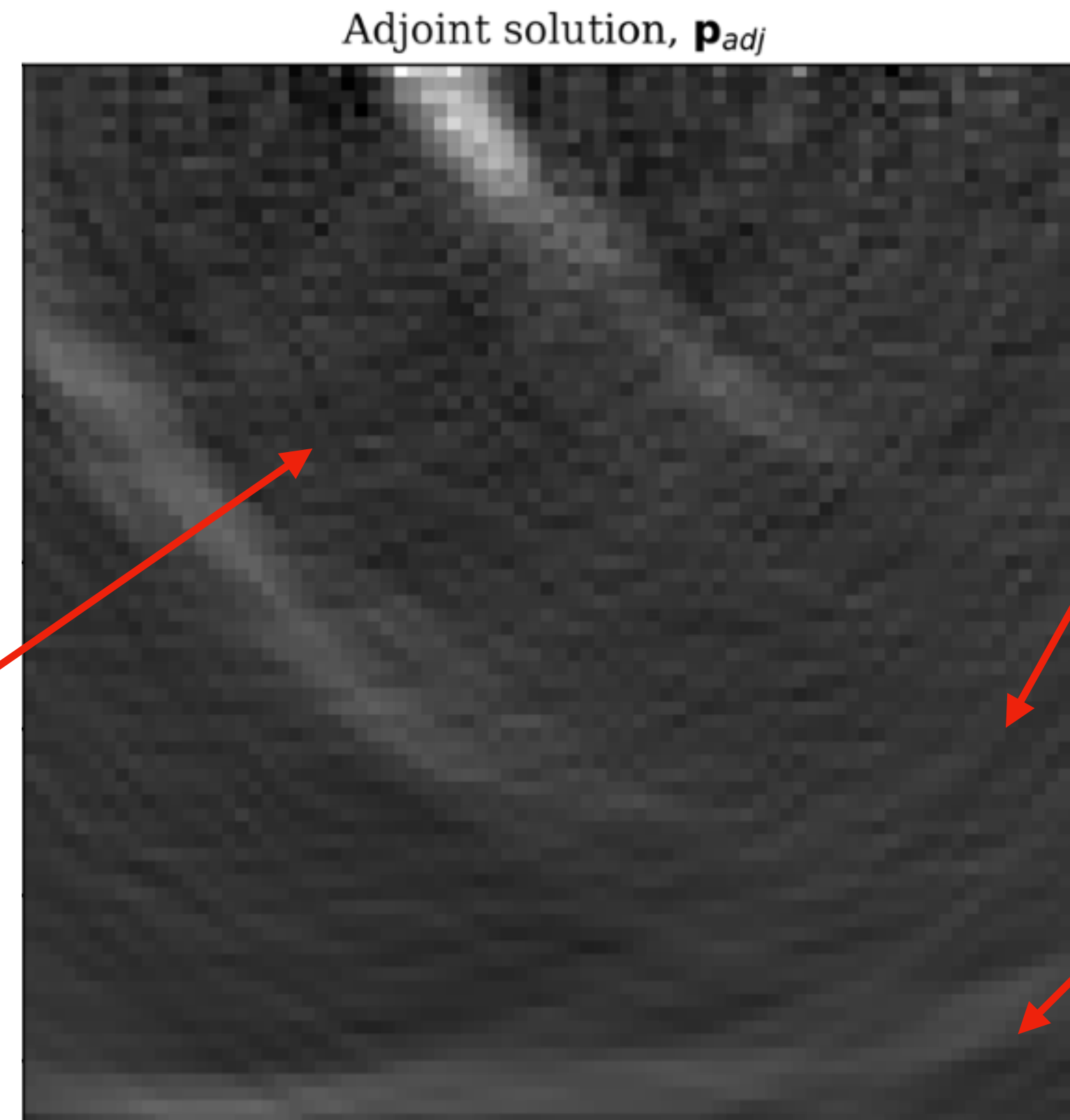
Large uncertainty in traditional reconstructions due to

‣ limited view geometry —> null space

‣ noisy measurements

‣ sparse receivers

True photoacoustic pressure, $\mathbf{p}$

• Receivers

Adjoint solution, $\mathbf{p}_{adj}$

Noise introduces amplitudes

Limited view streaks

Deeper vessels hard to image

46   Xu, Yuan, et al. "Reconstructions in limited-view thermoacoustic tomography." Medical physics 31.4 (2004): 724-733.

Proposed Approach – Variational Inference

Pose inverse problem in Bayesian formulation where the (conditional) posterior distribution encodes all sources of uncertainty

$$p(\mathbf{x} \mid \mathbf{y})$$