

# IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING

A PUBLICATION OF THE IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY



JANUARY 2024

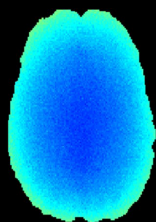
VOLUME 72

NUMBER 1

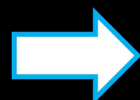
IEBEAX

(ISSN 0018-9294)

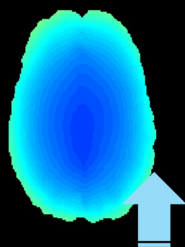
MR RF  
Phase



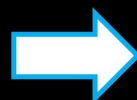
Phase  
Denoising



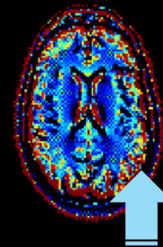
Denoised  
Phase



Phase-based  
EPT

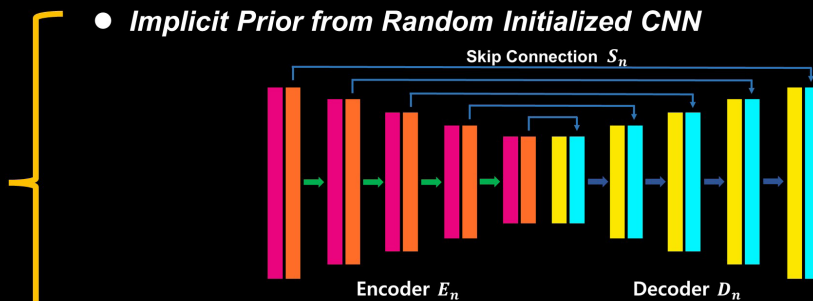


Conductivity  
Map



## *Denoising Method:*

- *Implicit Prior from Random Initialized CNN*



- *Optimized with Stein's Unbiased Risk Estimator (SURE)*

$$\theta^* = \operatorname{argmin}_{\theta} (\|x_0 - f_{\theta}(x_0)\|^2 + 2\sigma_Y^2 \operatorname{div}_{u_0}(f_{\theta}(x_0)) - \sigma_Y^2)$$

Developing a self-supervised denoiser for featureless RF phase corrupted by non-Gaussian noise, leveraging a randomly initialized CNN prior optimized using an unbiased estimator (SURE). This label-free and pre-training-free method operates directly on single noisy images, accommodating variations in contrast, SNR, and resolution. See “Deep Network Regularization for Phase-based Magnetic Resonance Electrical Properties Tomography with Stein’s Unbiased Risk Estimator” by Chuanjiang Cui et al., p. 43.



Indexed in PubMed® and MEDLINE®, products of the United States National Library of Medicine

