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Decades of Radar Innovations

Dense Scene Detection & Tracking
Multi-static Target Association
Sensor Fusion
Target ID
High Definition Imaging
Convolution Array Design

IARPA SINTRA Proposers' Day
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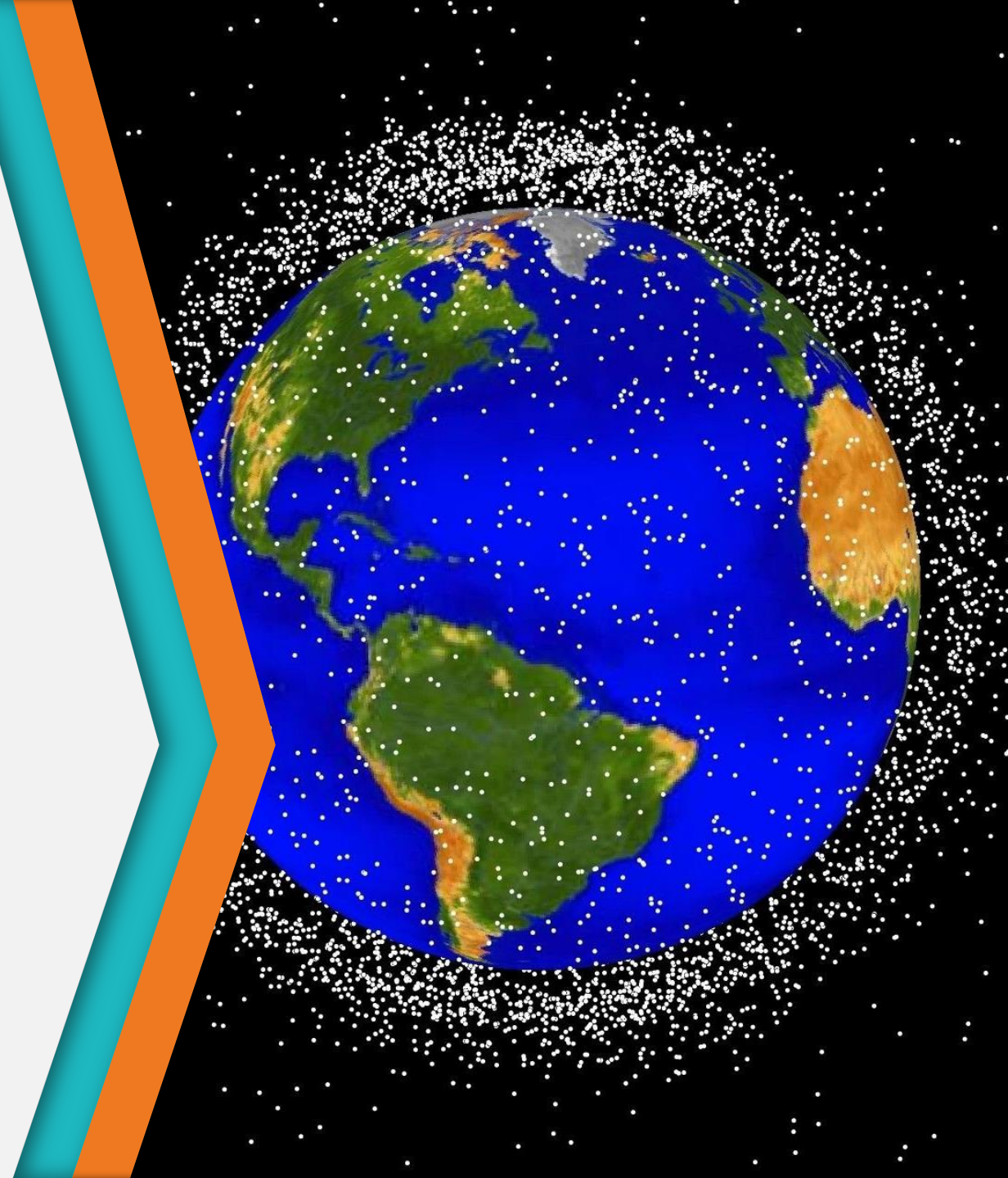


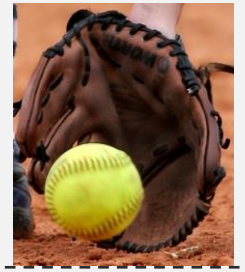
Space Debris Challenges & Opportunities

Radar View

Variable wavelength dependent material properties & geometry
Static vs tumbling RCS statistics & dynamic range
Debris field density
Ground vs space platforms

Debris Size & Quantity [1]

> Softball	> Marble	> Dot
> 10 cm	> 1 cm	> 1 mm
> 20K	500K	135,000K

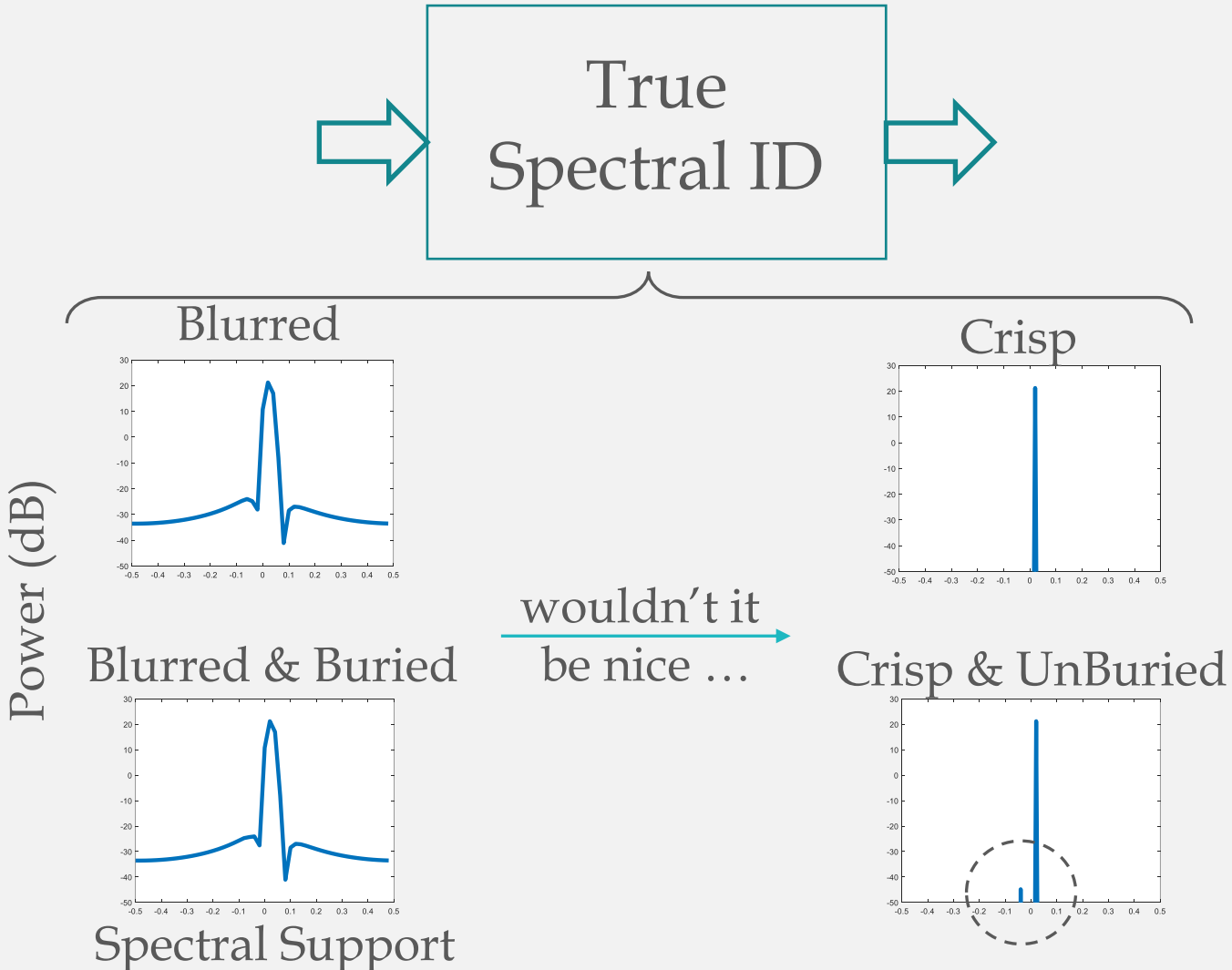


RFNav can help,

Passive bi-static detection & imaging
Detection of small adjacent to large objects
Dense scene tracking
Debris class-ID (field/particle shape, NaK, …)

[1]Adapted from, https://www.nasa.gov/pdf/692076main_Orbital_Debris_Management_and_Risk_Mitigation.pdf

Small Targets Buried in Large Target Sidelobes

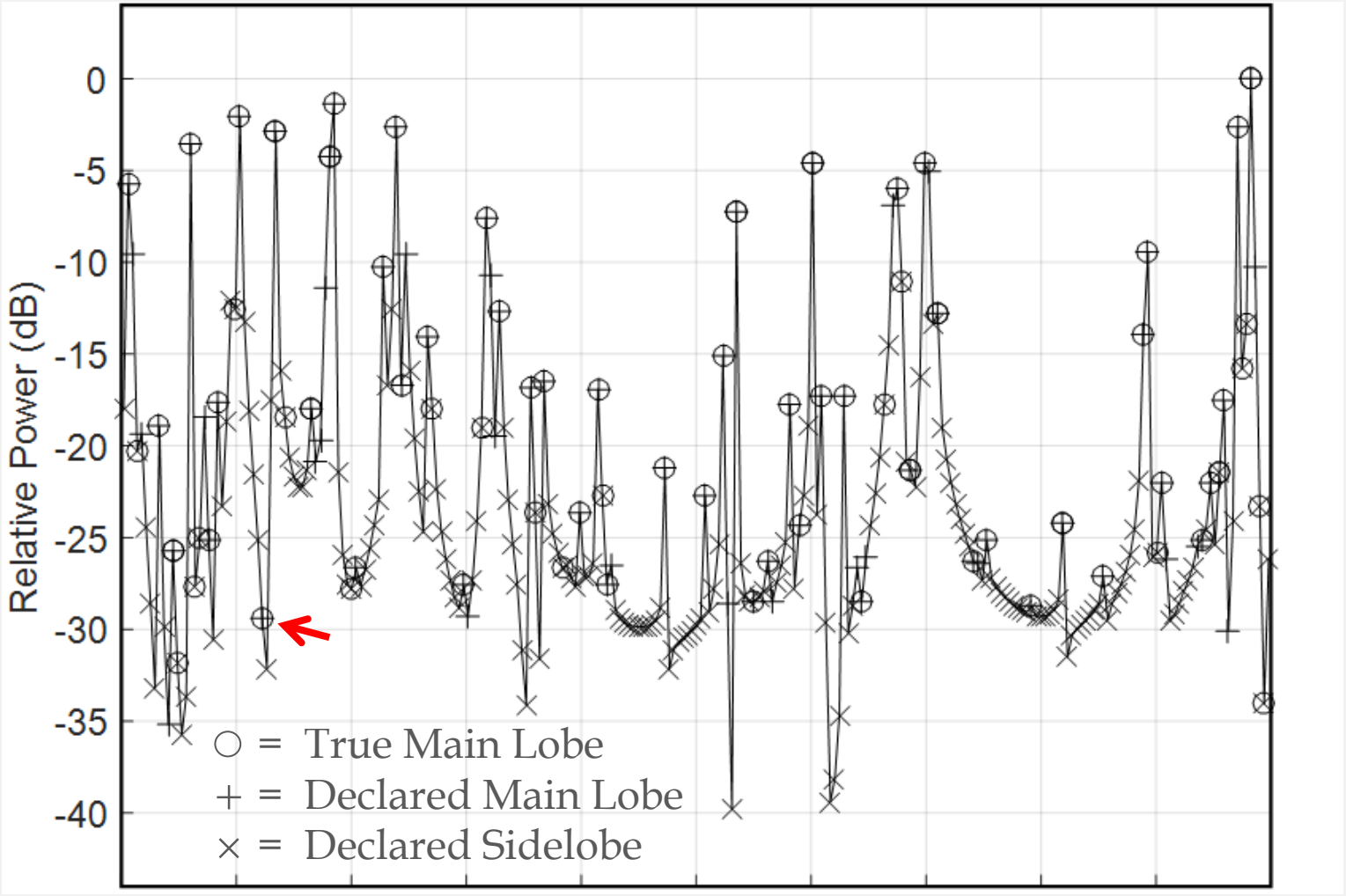


Goals:

- Maximize Detection Probability
- Minimize False Alarm Probability
- Crisp image with minimum blur
- Uncover buried targets

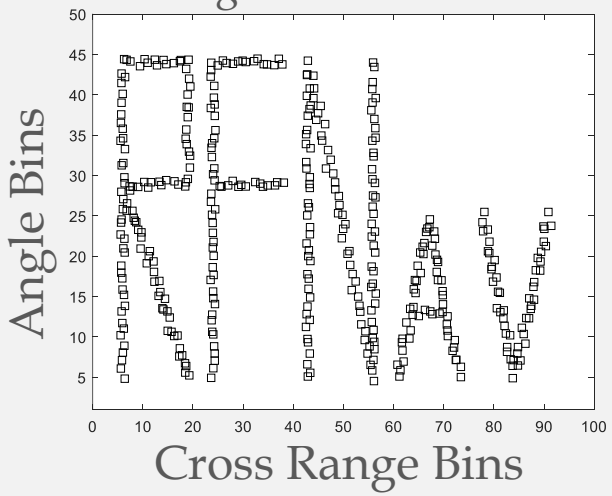
RFNav MLSL Discrim in Dense Scene (1-D Example)

- Single Look
- MLSL Discrim has high probability of correctly identifying true signals from sidelobes and artifacts
- Patented signal processing & AI methodology

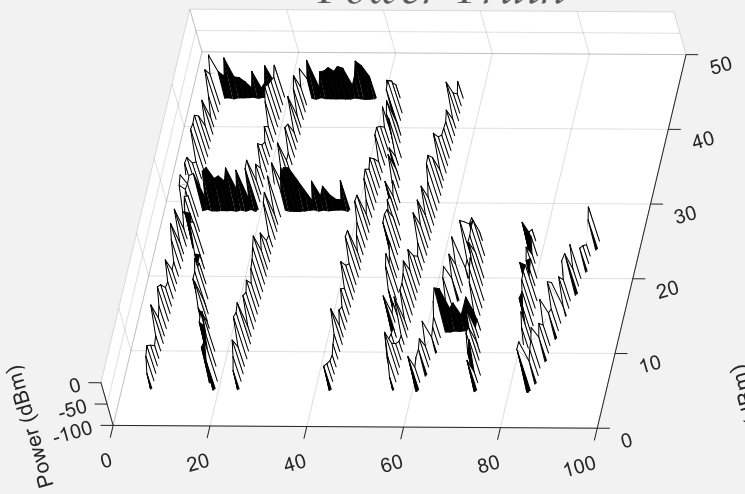


2-D Example
Single look, 80 dB Target Dynamic Range

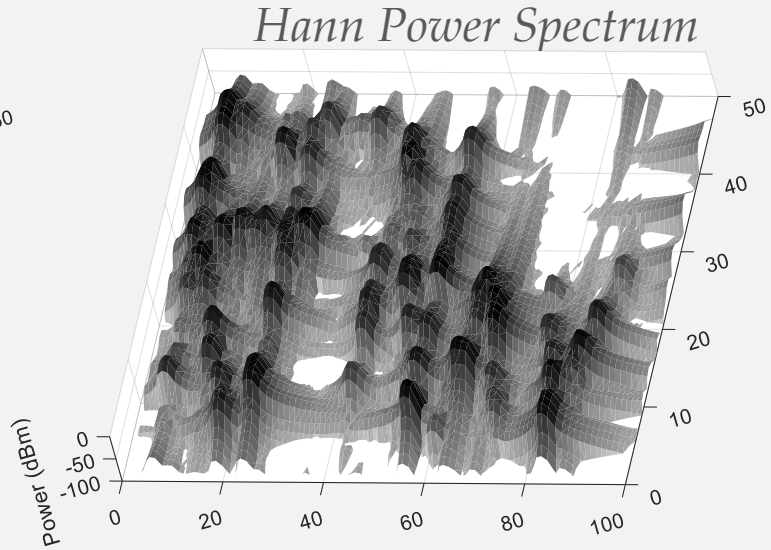
Analog Location Truth



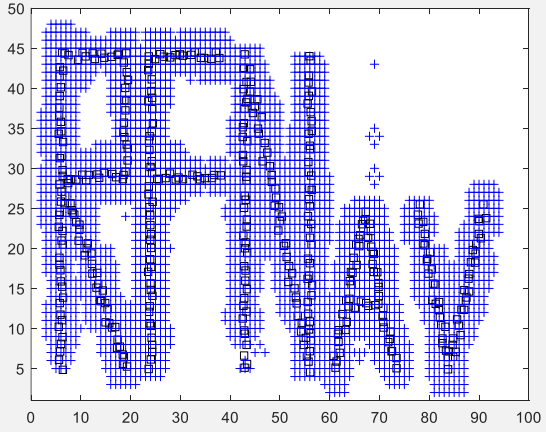
Power Truth



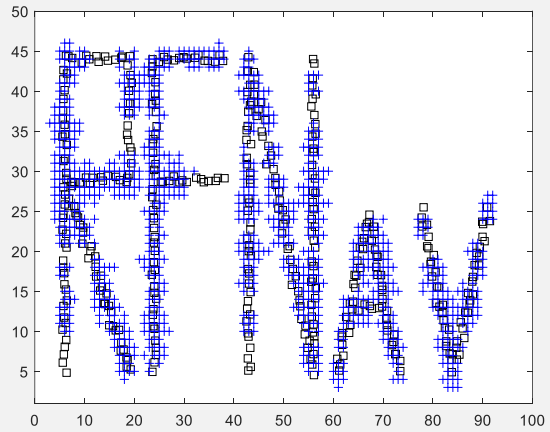
Hann Power Spectrum



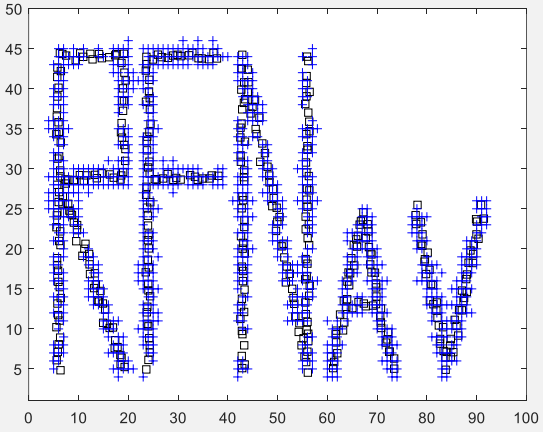
Legacy 1, 80 dB, Blur = 1.66



RFNav, 80 dB, Blur = 0.99

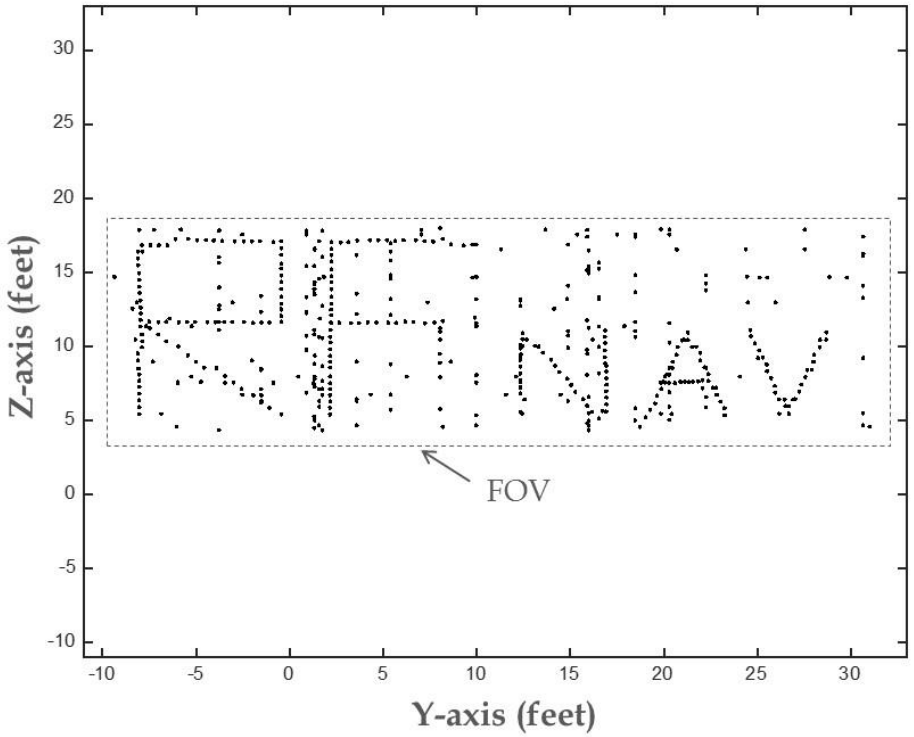


RFNav, 30 dB, Blur = 0.81

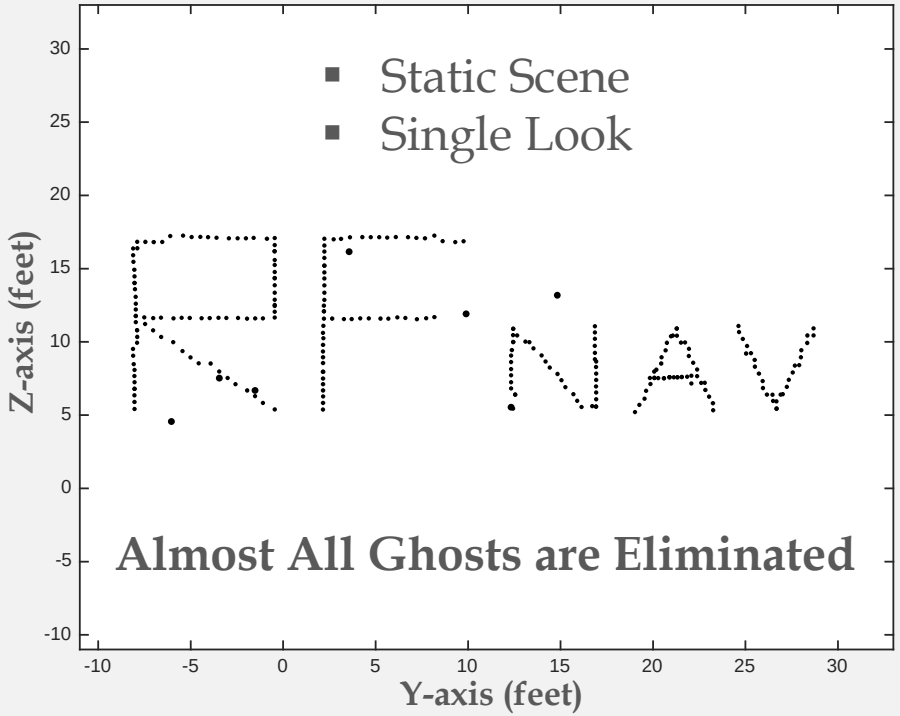


RFNav Radar Fusion Example

Traditional Fusion Compromised by Ghosts



RFNav Sensor Fusion

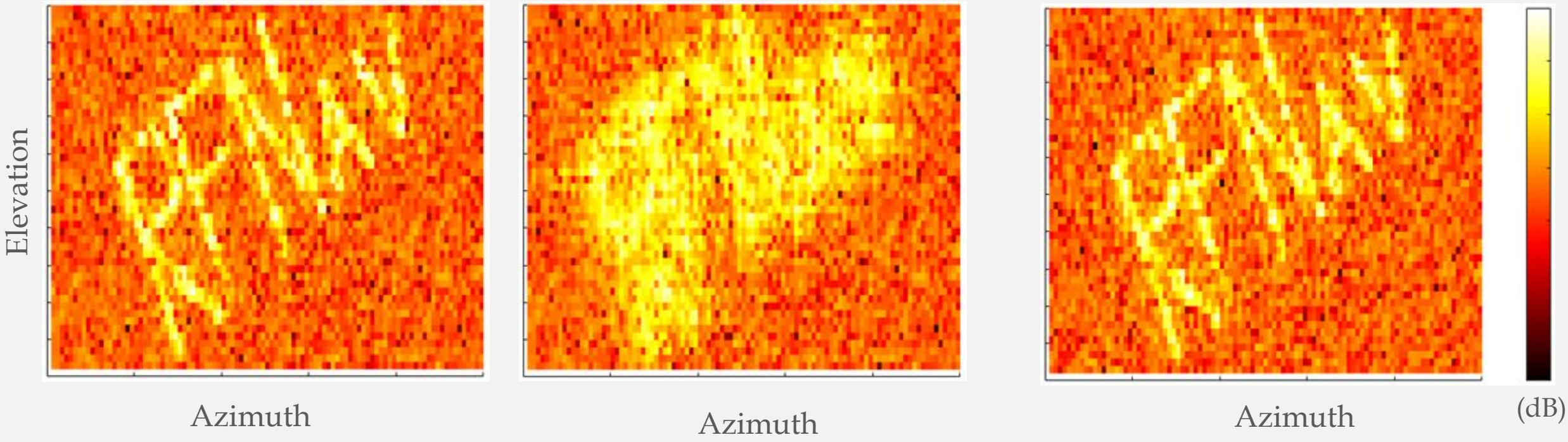


Distributed Array Vibration Compensation

Single Look Radar Image

Image Corrupted by Virtual Aperture Motion & Vibration

RFNav Vibration Algorithm Image Reconstruction



Let's Collaborate

RFNav can help with radar & processing,

- Exploitation of opportunistic multi-static emissions
- Detection of adjacent small & large targets
- High Precision Tracking in Dense Scenes
- Imaging
- Debris class-ID (field/particle shape, …)

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