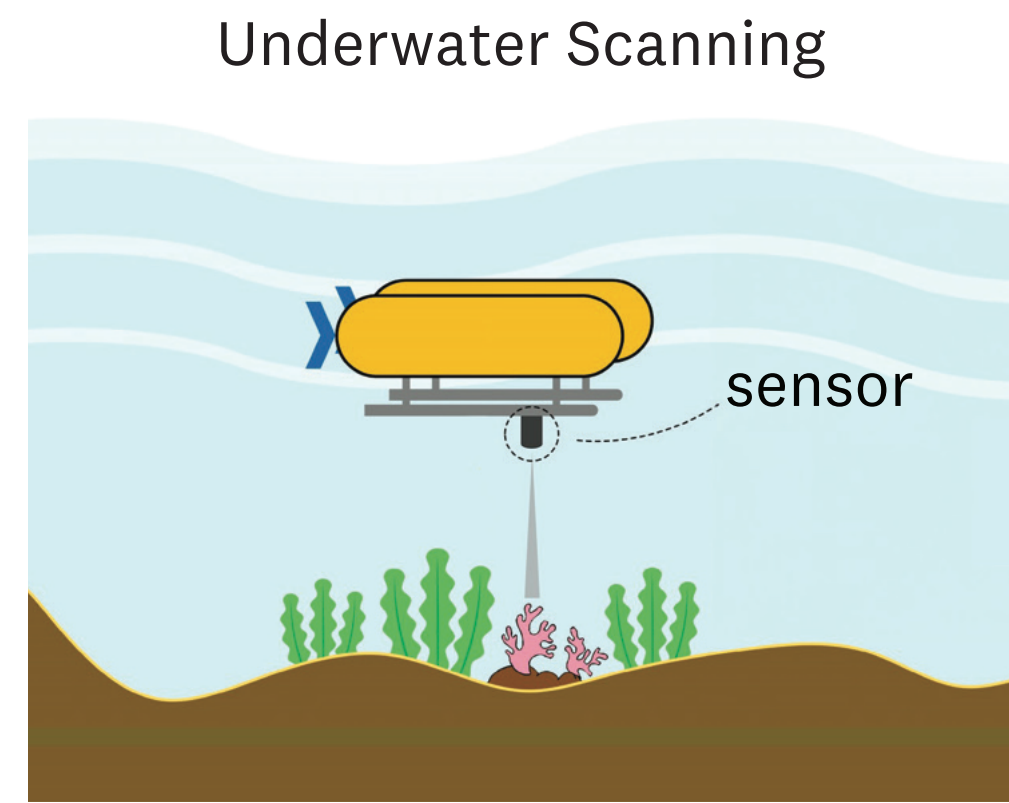
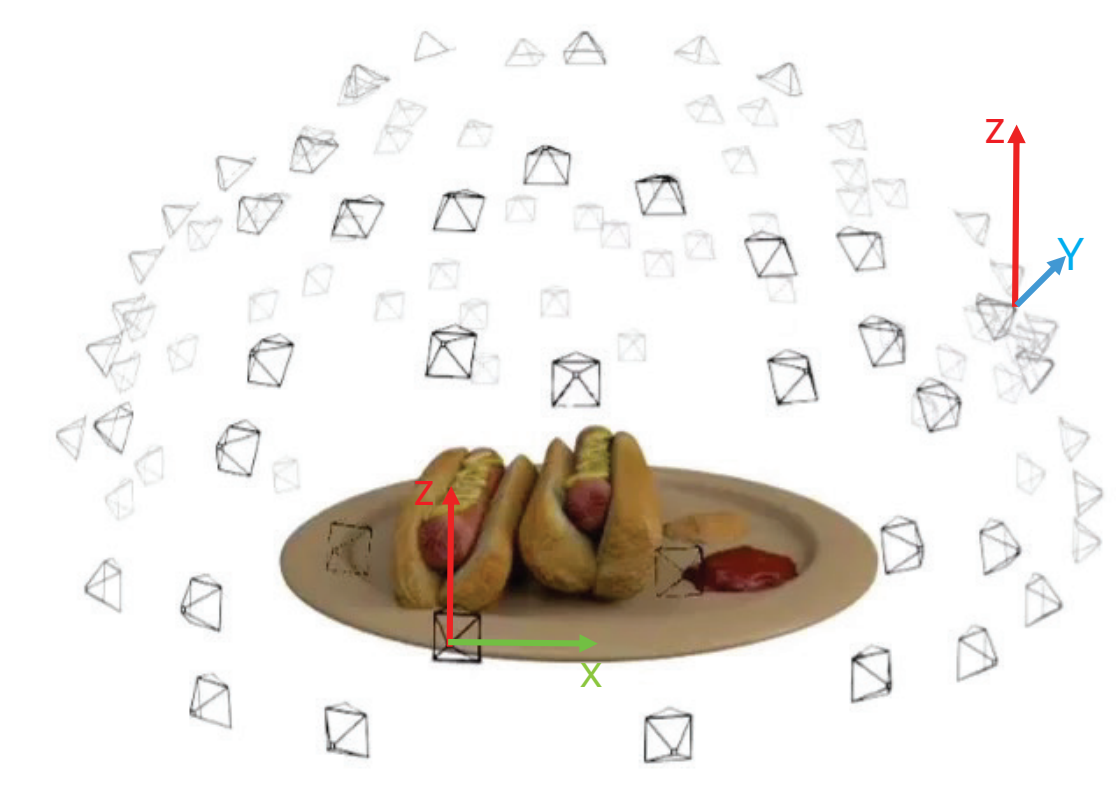


# Z-Splat: Z-Axis Gaussian Splatting for Camera-Sonar Fusion

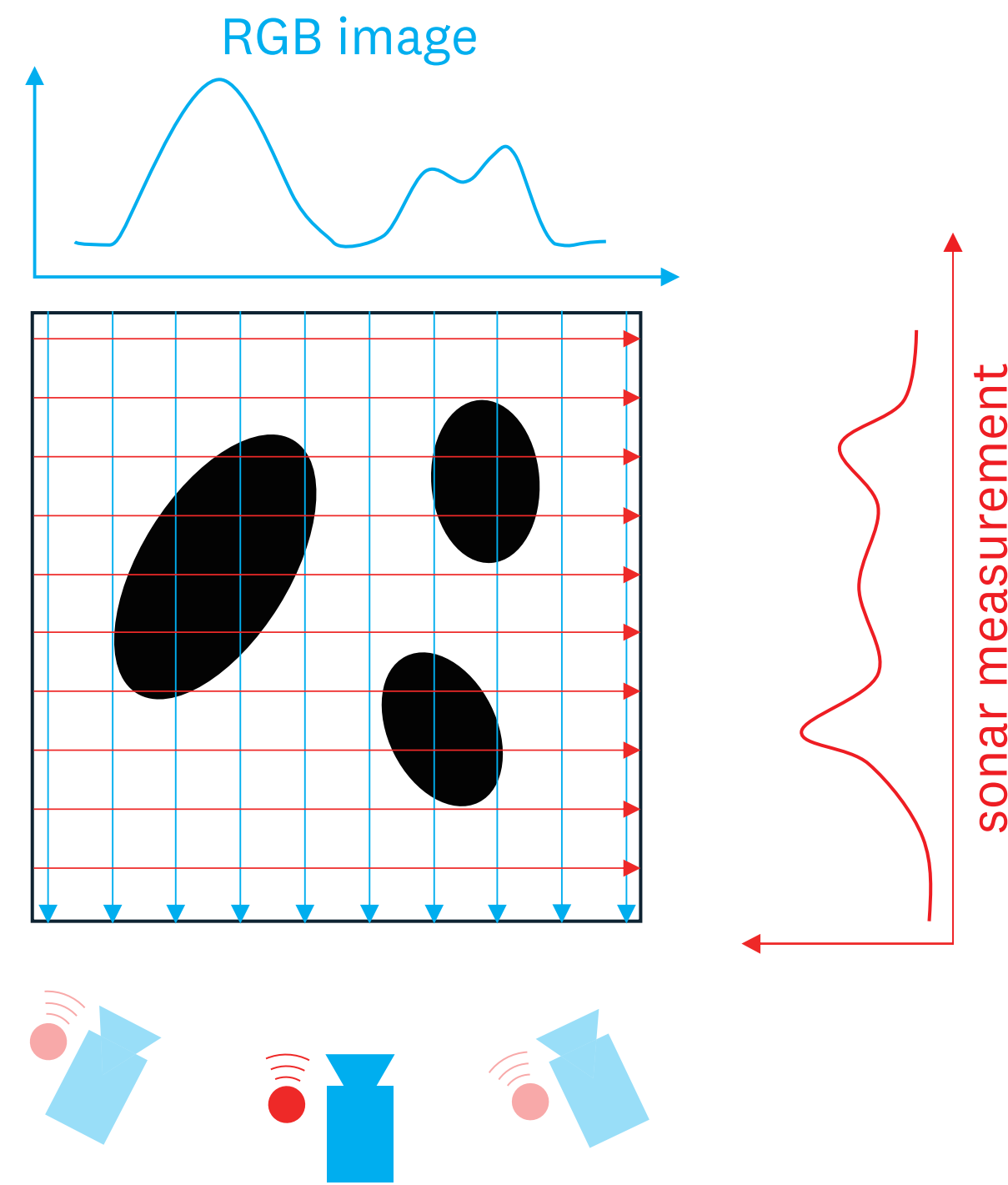
Ziyuan Qu<sup>1</sup>, Omkar Vengurlekar<sup>2</sup>, Mohamad Qadri<sup>3</sup>, Kevin Zhang<sup>4</sup>, Michael Kaess<sup>3</sup>, Christopher Metzler<sup>4</sup>, Suren Jayasuriya<sup>2</sup>, Adithya Pediredla<sup>1</sup>  
Dartmouth College<sup>1</sup>, Arizona State University<sup>2</sup>, Carnegie Mellon University<sup>3</sup>, University of Maryland<sup>4</sup>

## Purpose

### Small Baseline Scenario

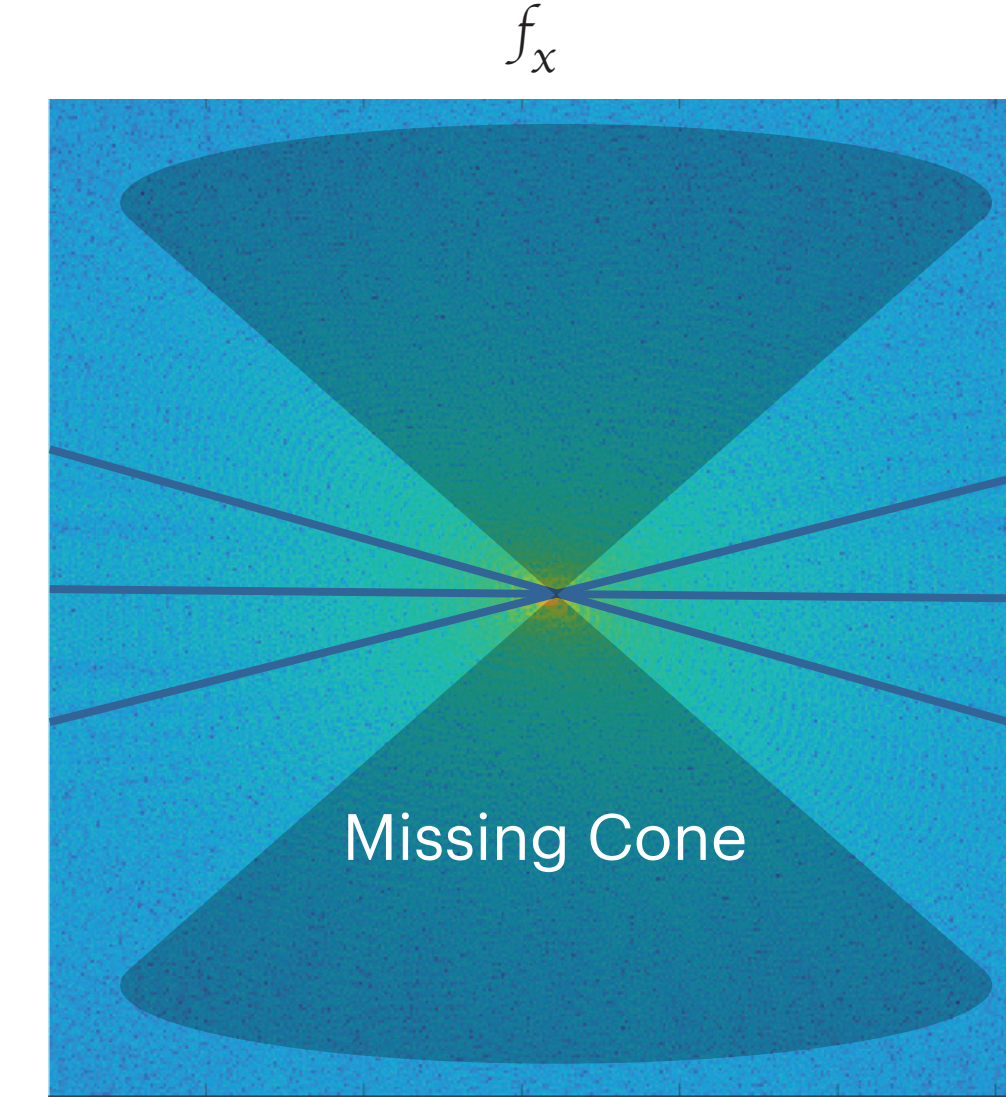


- Solve the “missing cone” problem in the small baseline scenarios.
- Fuse camera and time-resolved measurement (e.g. sonar).
- Take the advantage of explicit representation and computationally efficiency from Gaussian Splatting.



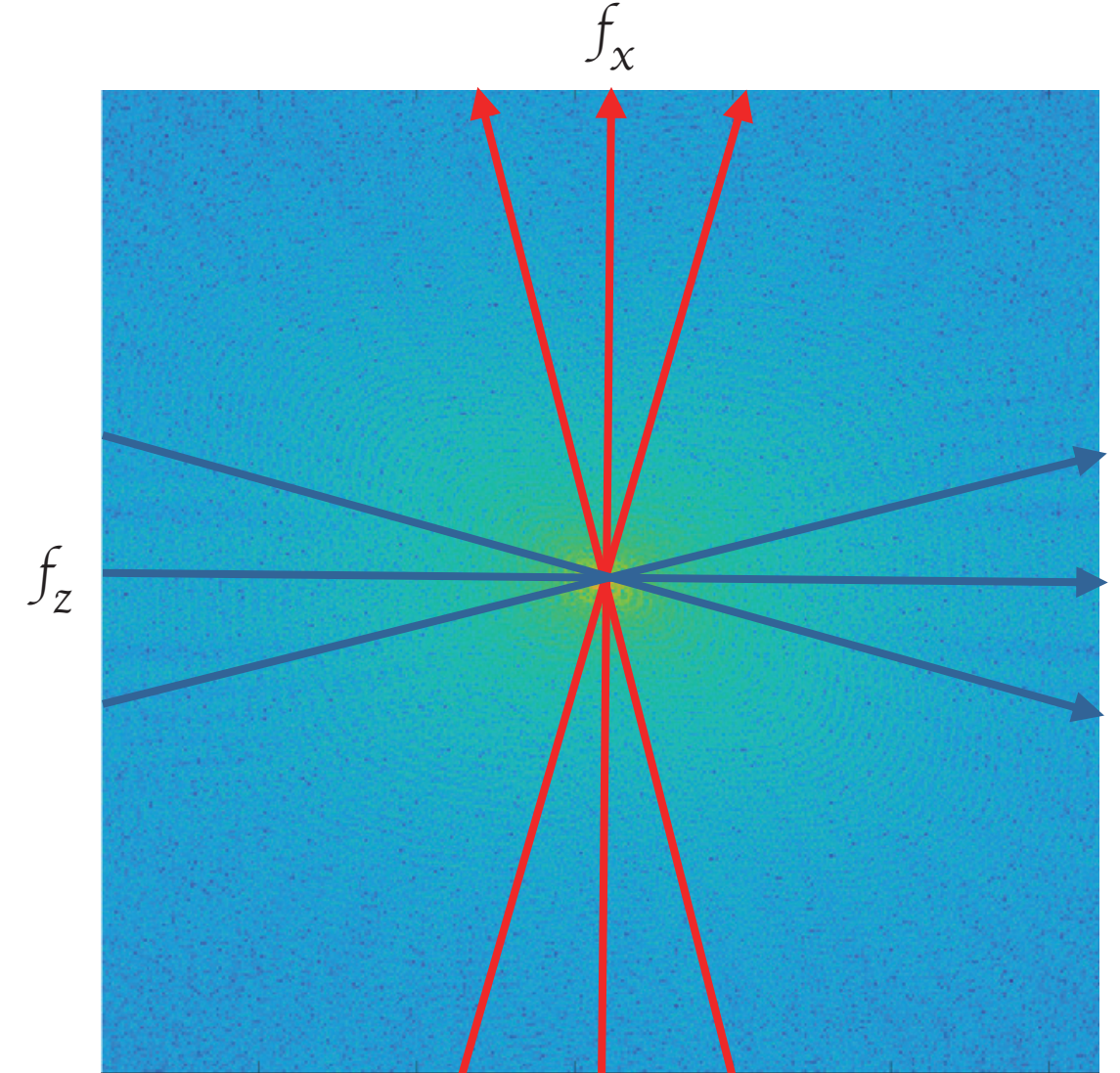
### Missing Cone Problem

#### Fourier Domain (RGB Only)



camera only measurements make the problem ill-posed

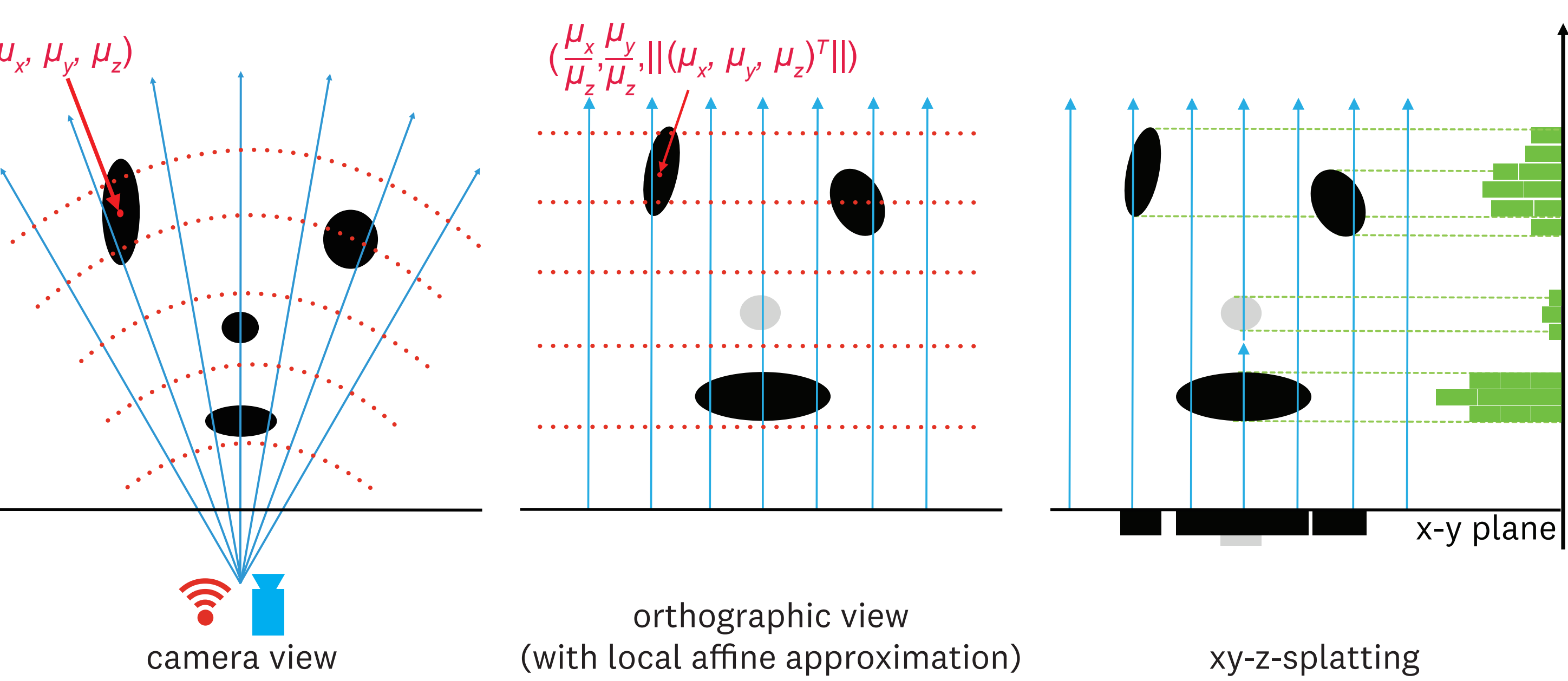
#### Fourier Domain (RGB + Sonar)



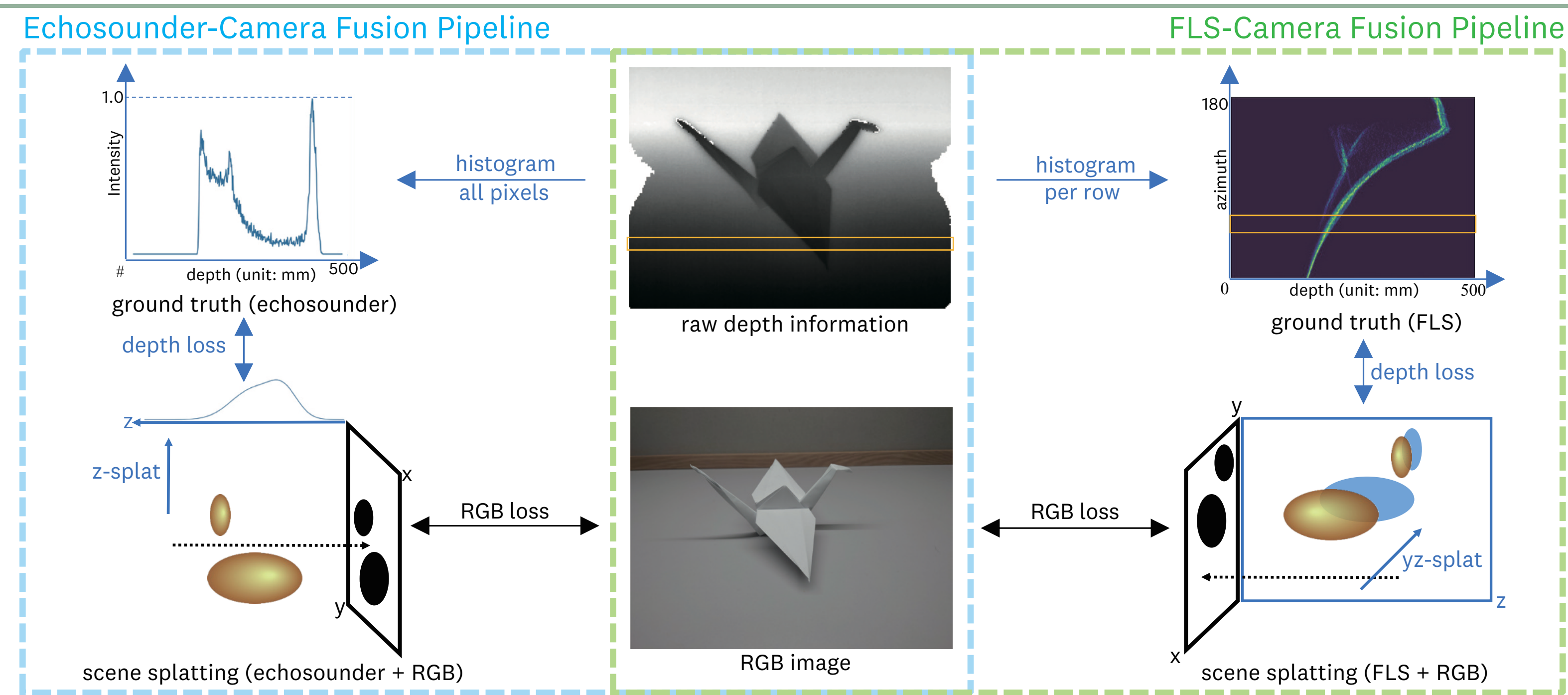
complementary information helps few-shot problem

## Method

### Splatting Operation

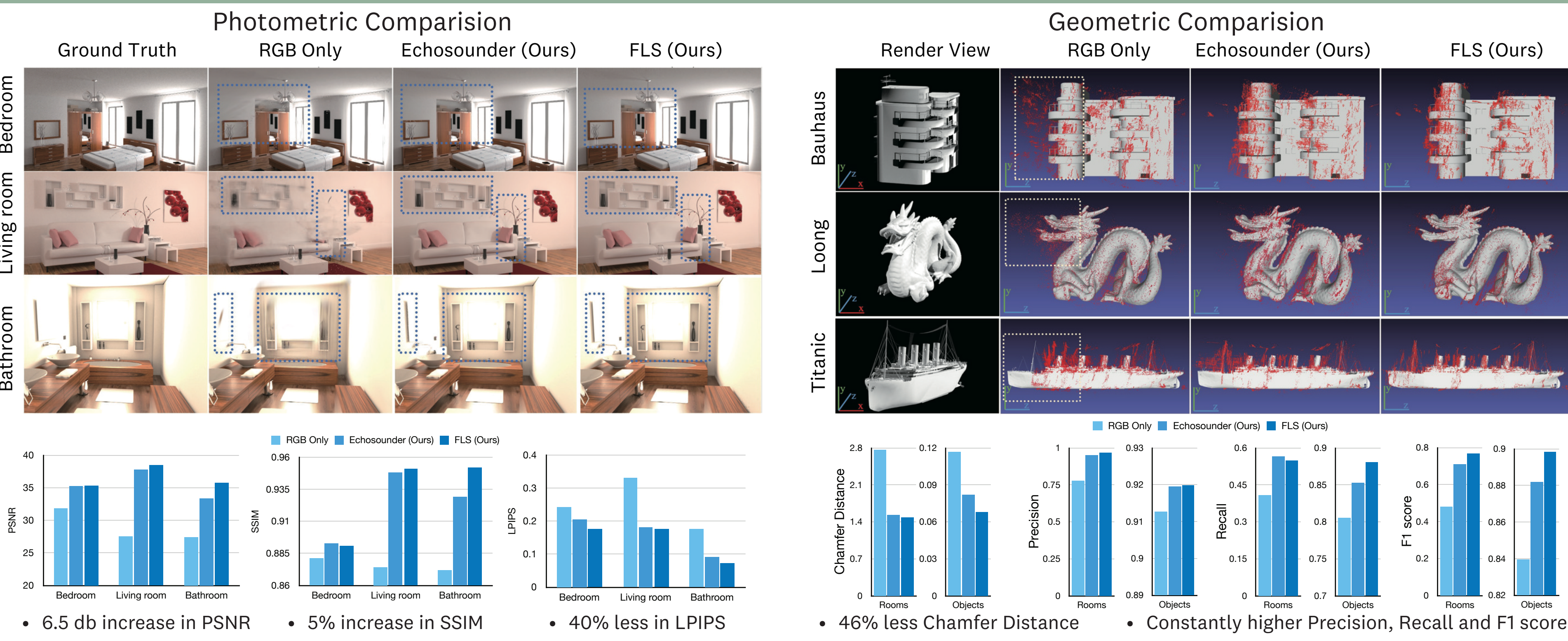


### Experiment Pipeline

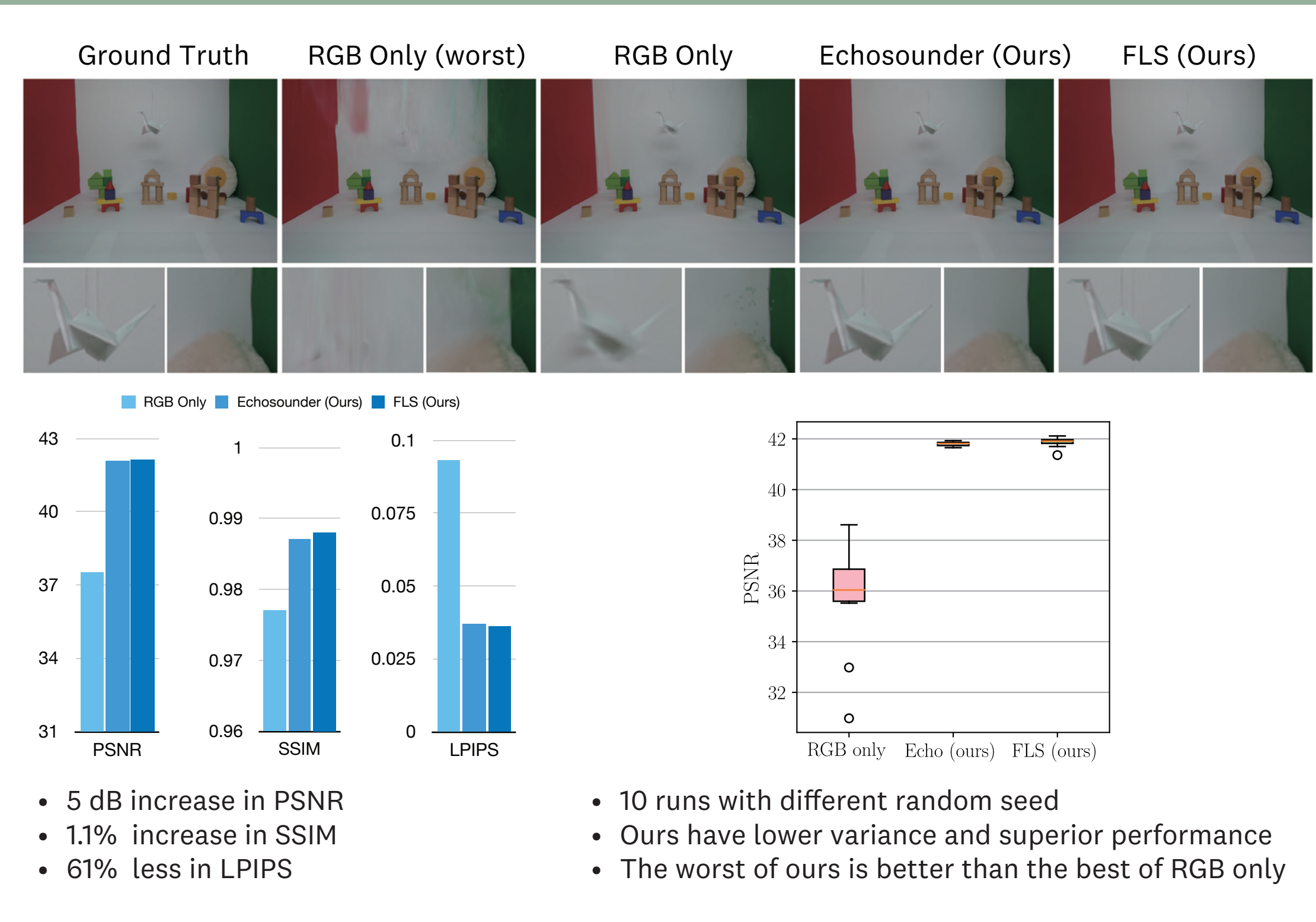


## Experiments and Results

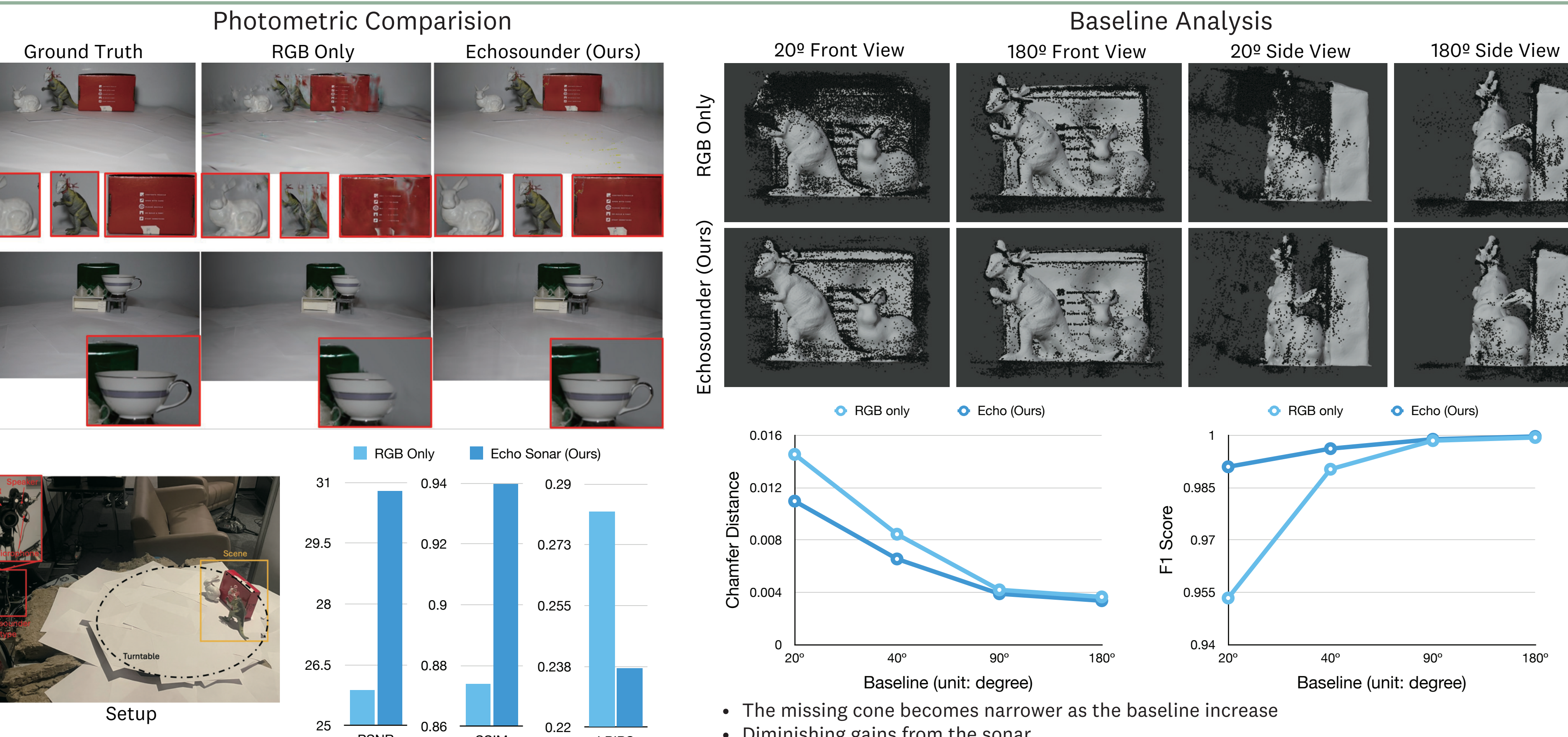
### Simulation



### Emulation



### Hardware - Echosounder



### Hardware - Forward Looking Sonar

