BalloonWinds Reintegration and Modeling

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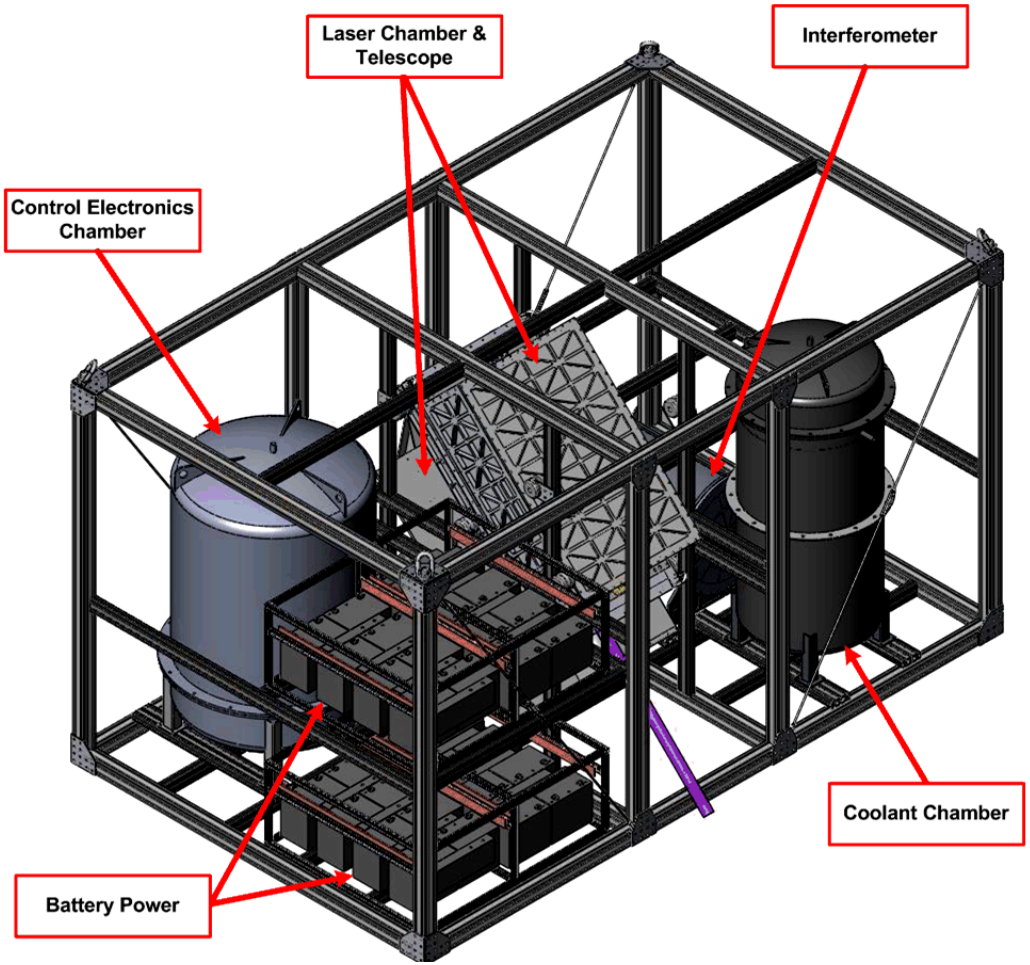
BalloonWinds

Instrument Overview



Size: 8’x8’x12’

Gondola Mass: 6000 lbs

Power Requirements: 1300 W

Power System:

26 Lithium-Ion Batteries

Thermal Management:

Ice and Electric Heaters

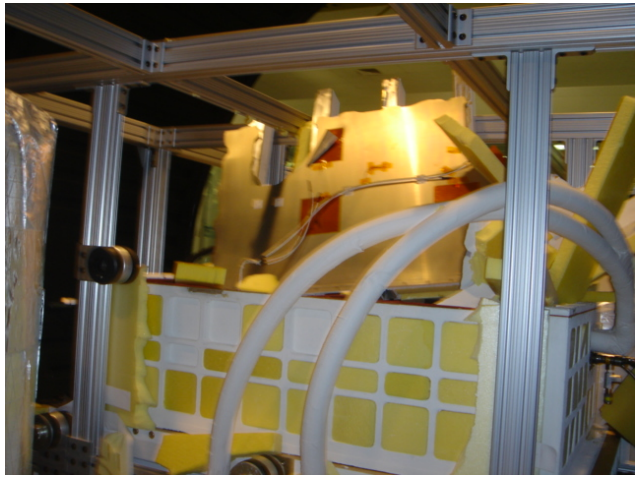
Optical Systems:

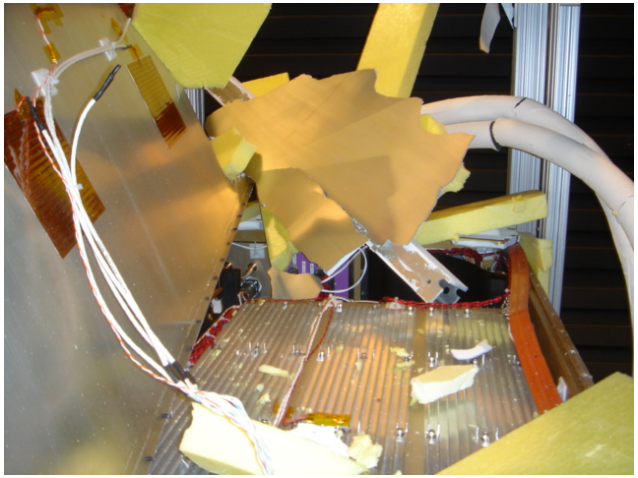
Diode-Pumped Nd:YAG

½-meter Telescope

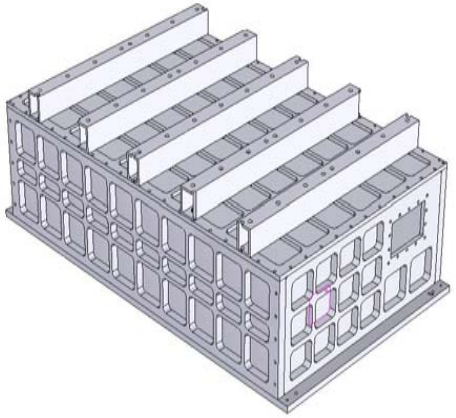
Direct-Detection Receivers (2)

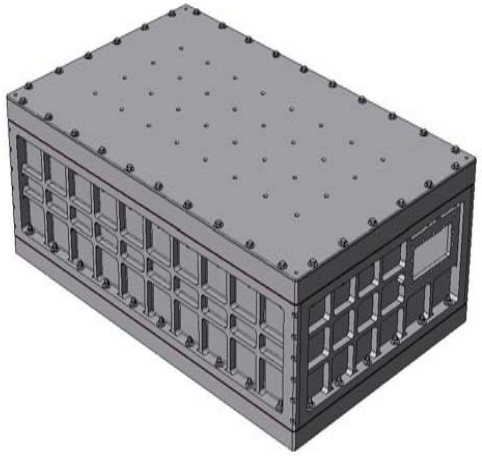
Last Update… Failure & Analysis





Last Update… New Design



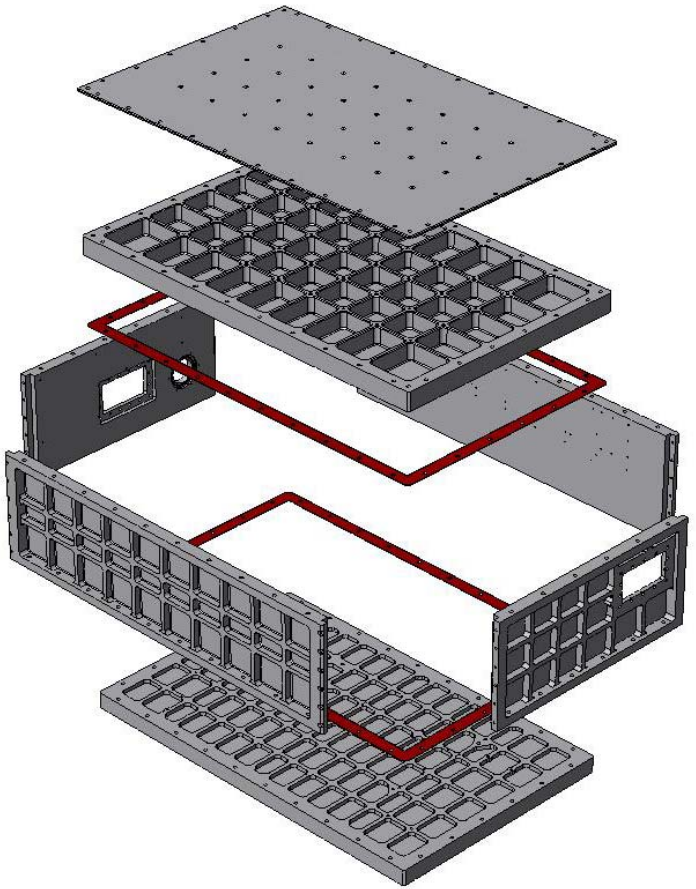


Material:	Cast Aluminum MIC6	Wrought Aluminum 6061-T6
Ultimate Strength:	166 MPa	310 MPa
Yield Strength:	105 MPa	275 MPa
Elongation at Break:	3%	12%
Lid thickness (M/R)	0.5” (0.065”)	2.25” (0.25”)
Lid/base attachment	Inserted threads	Through bolts
Weight	~200 lbs	~400 lbs

Laser Chamber Design

Geometry

- Lid:
  - 2.25” thick with weight relief and top plate
  - 3/8” through bolts aligned with ribs
- Base Plate:
  - 2.25” thick with weight relief
  - 3/8” through bolts for base plate
- Walls:
  - 1.5” thick with weight relief
  - Bolted at corners before welding



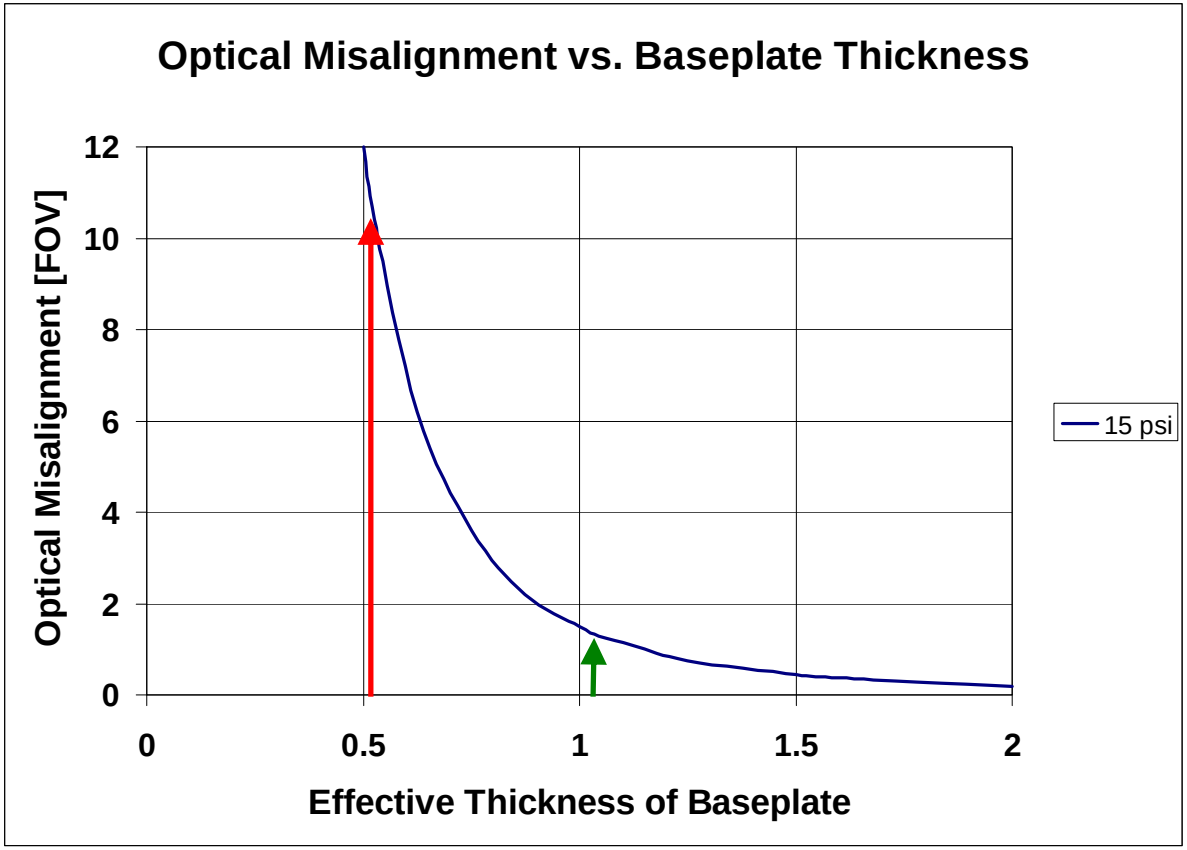
Laser Chamber Base Plate

- Base Plate Comparison

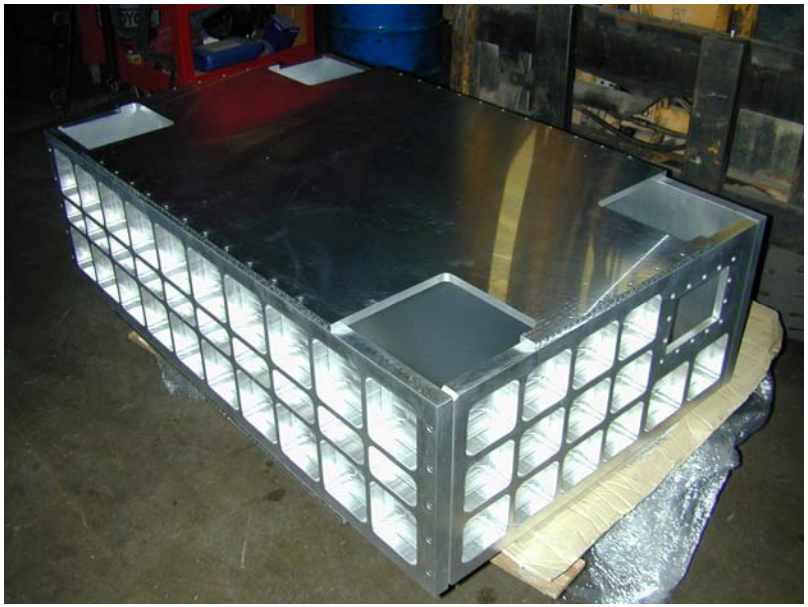
  Old/New

- Double effective thickness

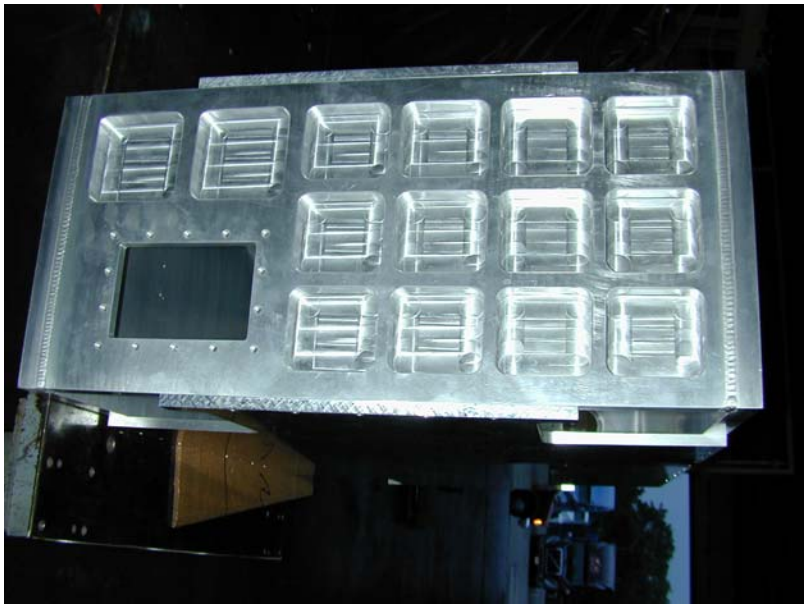
- 85% reduction in optical misalignment

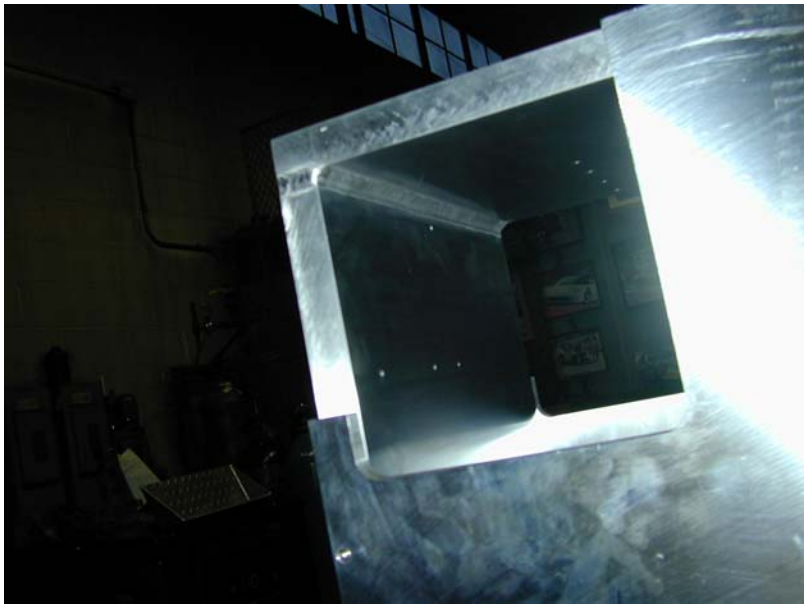


Laser Chamber Build pre-welding



Laser Chamber Build post-welding





Laser Chamber Testing

- Passed hydrostatic pressure test @ 28 psig
- Passed pneumatic pressure test @ 22.5 psig

- Final assemble pressure test @ 22.5 psig remains

Chamber Reviews

Coolant Tank

	Material	304L Stainless Steel
	Volume (empty)	18 cubic feet
	Design Pressure	18.75 psig
☑	Test Pressure (Hydrostatic)	28 psig
	Assembly Test Pressure (Pneumatic)	22.5 psig (1.5× MEOP)

Electronics Chamber

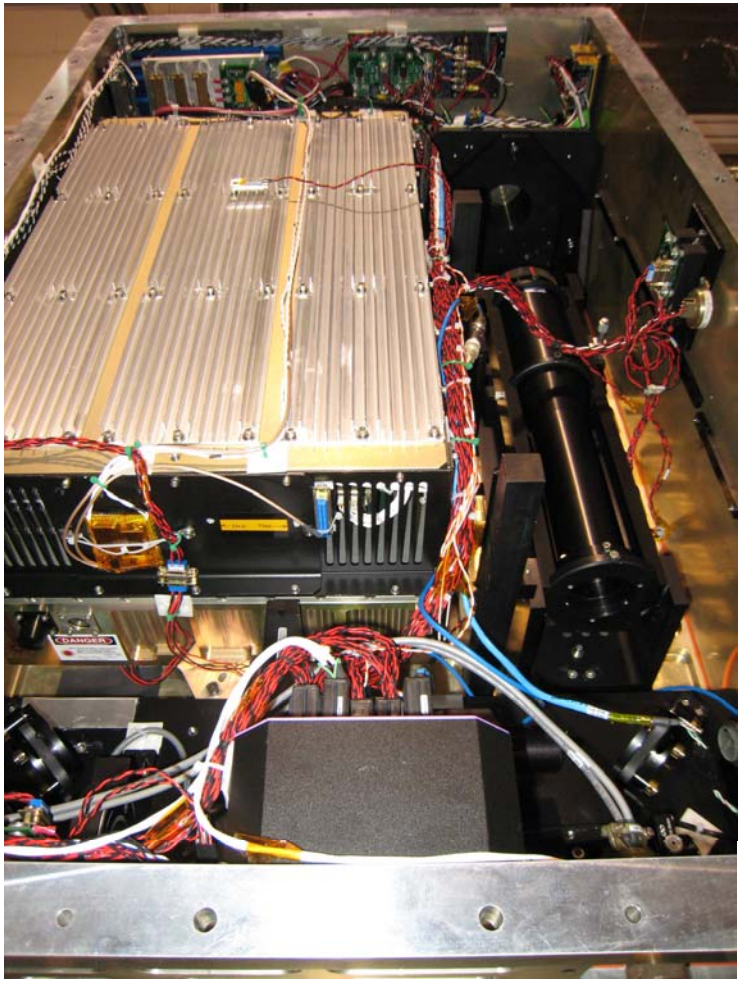
	Material	304L Stainless Steel
	Volume (empty)	30 cubic feet
	Design Pressure	18.75 psig
☑	Test Pressure (Hydrostatic)	28 psig
☑	Assembly Test Pressure (Pneumatic)	22.5 psig (1.5× MEOP)

Interferometer Chamber

	Material	304L Stainless Steel
	Volume	14 cubic feet
	Design Pressure	16.5 psig
☑	Assembly Test Pressure (Pneumatic)	22.5 psig (1.5× MEOP)

Laser Chamber Reintegration

Laser Chamber Reintegration



Revised BalloonWinds Schedule

Activity	Date
Laser Chamber CDR	01 Aug 07
Re-Integration	28 Feb 08
Leave UNH	7 Apr 08
Thermo-Vacuum Test	20 Apr 08
First Launch	21 May 08
Second Launch	11 Jun 08
Return to UNH	16 Jun 08

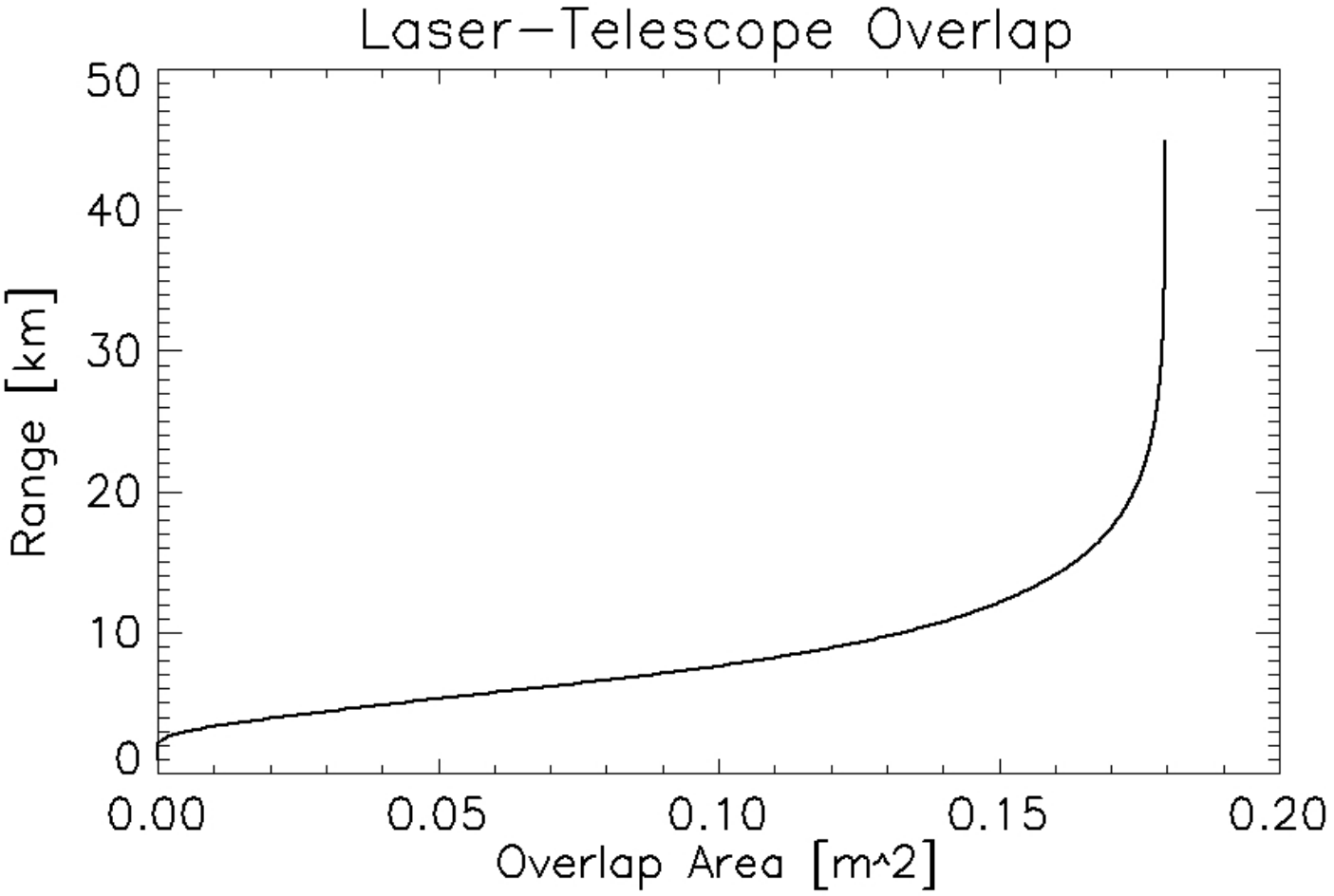
BalloonWinds Modeling

- Laser-Telescope
- Atmosphere
- Interferometer Optics
- Detectors

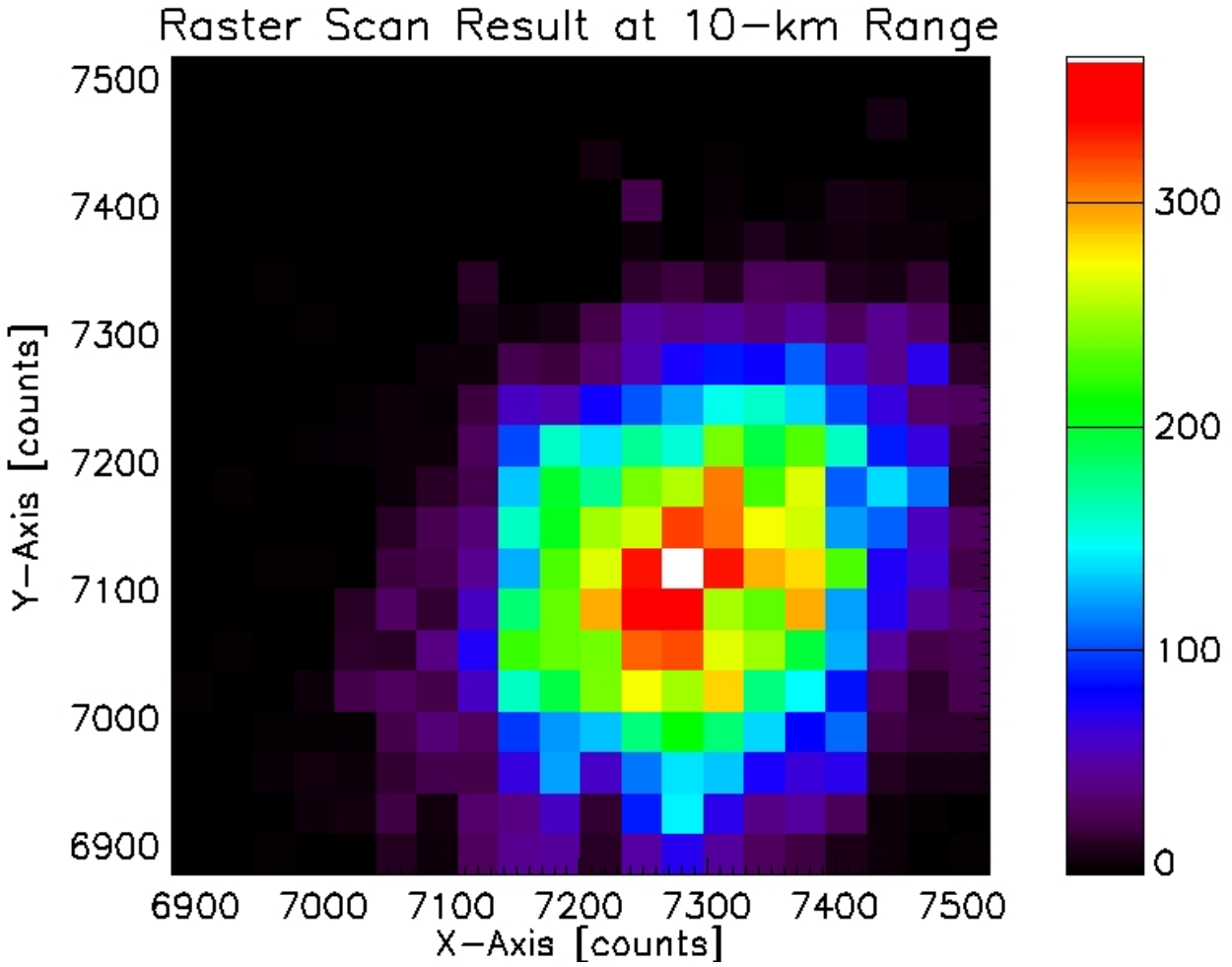
} Instrument Model

- Performance Model
  - Photometric return
  - Wind uncertainty

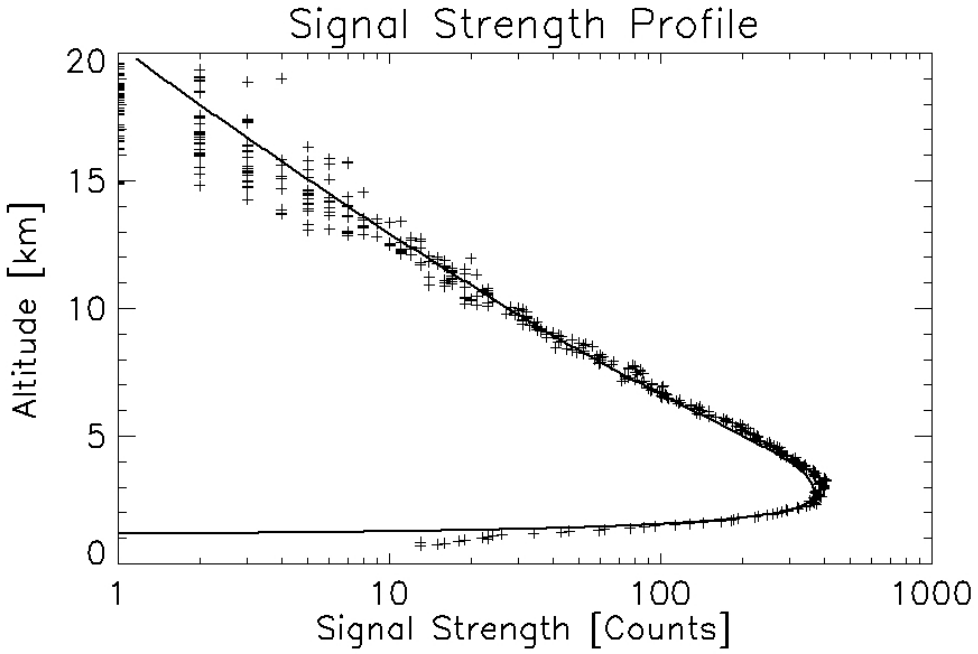
Laser-Telescope Overlap



Laser-Telescope Raster



Laser-Telescope Model

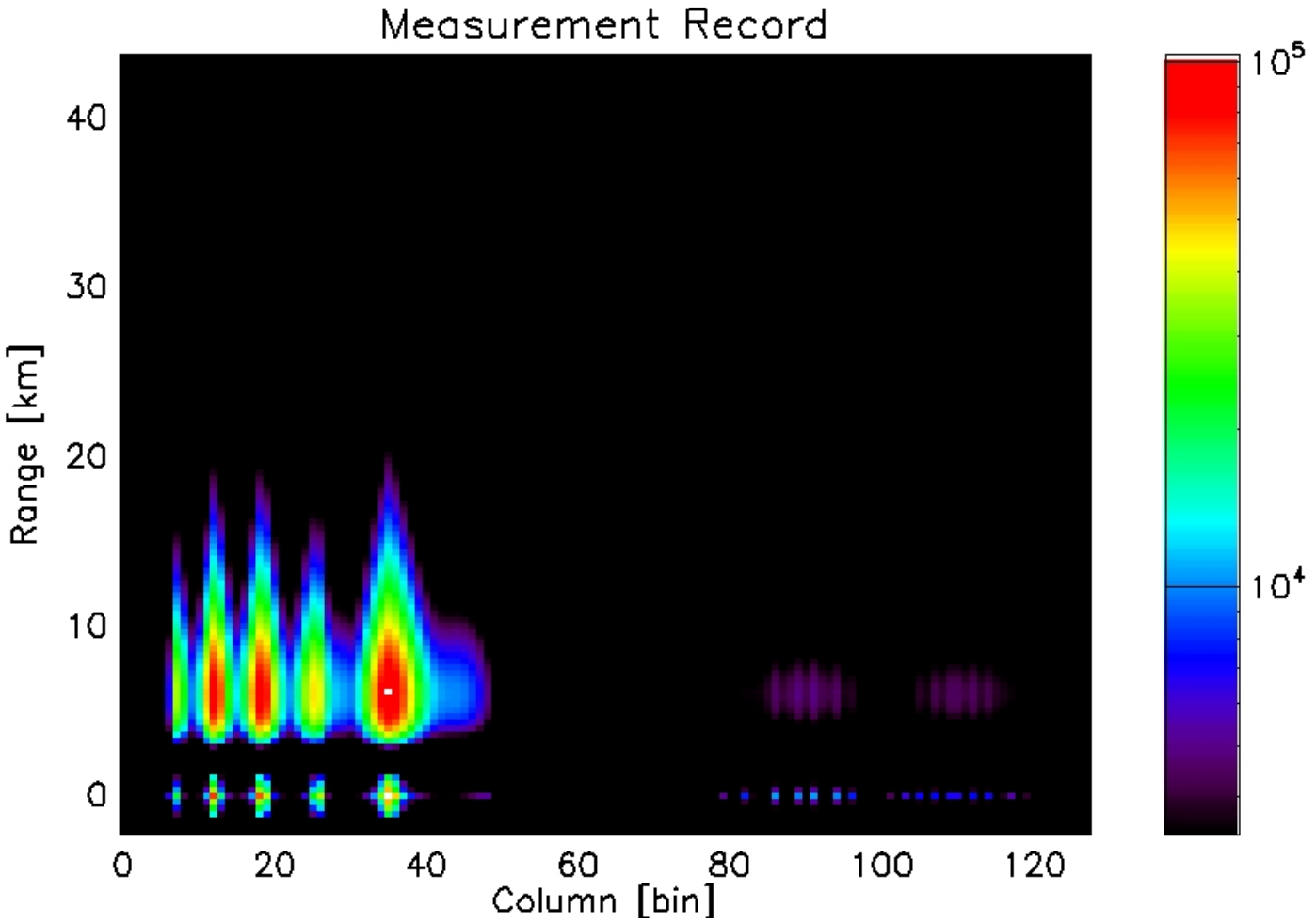


Yaw = 10.2 μrad Pitch = 4.0 μrad Defocus = -0.2 mm

Div = 96 μrad Scale Factor = 0.12

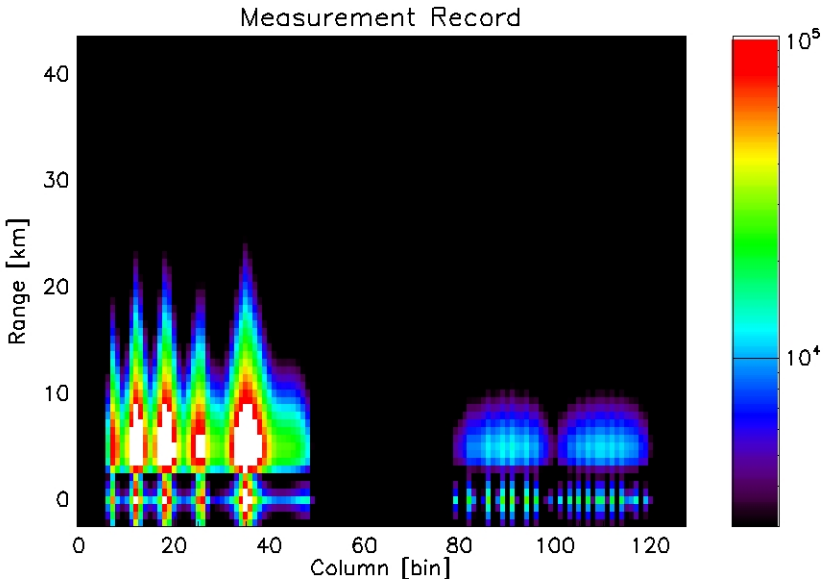
Instrument Model

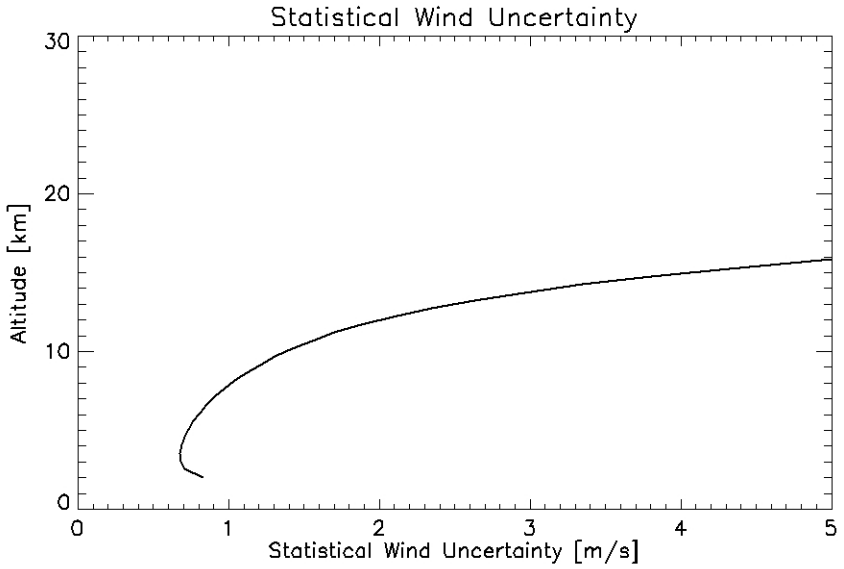
Combined Models



Instrument Model

Up-Looking Predictions





Instrument Model

Down-Looking Predictions