



Observing Program Update

Erick Young
SOFIA Science Center



SOFIA Users Group 15 April 2015





Question Posed by SUG



- With the goal of maximizing the scientific productivity of SOFIA, what is the optimal balance of resources among flight hours and other factors effecting SOFIA science productivity such as pipeline development, instrument upgrades, new instruments, GI funding, etc.?





Historical General Principles

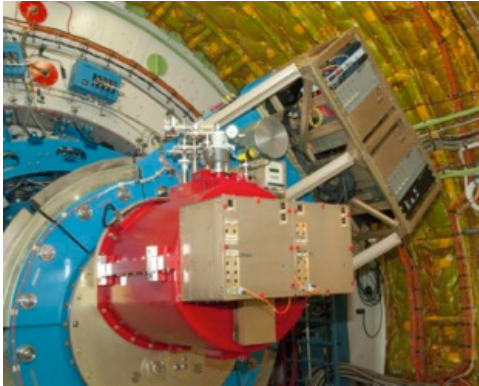


- Up until the near death experience last year, SOFIA has been guided by several assumptions:
 - SOFIA is a general purpose observatory, and the best science came out of proposal calls to the general community
 - SOFIA required a broad suite of scientific instruments that spanned the full optical to submillimeter range
 - Achieving 960 Research Hours/year was one of the key measures of success
 - Calibrated data in a publicly accessible archive was a key goal
 - Continued development of the observatory was needed to support potential science at all wavelengths in the SOFIA regime





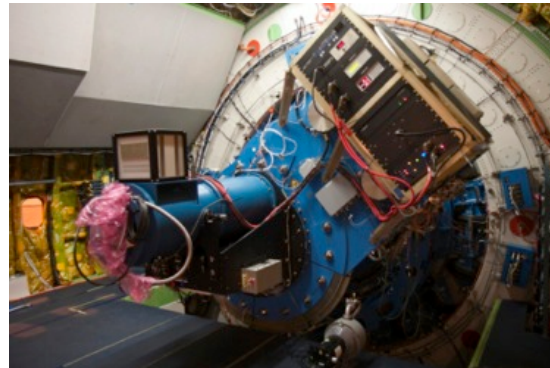
Instrument Complement



FORCAST
Mid-IR Camera

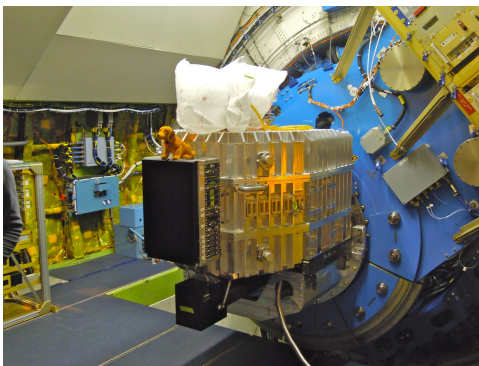


GREAT
Heterodyne
spectrometer



FLITECAM
Near IR Camera

HIPO
Occultation Photometer



FIFI-LS
Integral Field
Spectrometer



EXES
High Resolution
IR Spectrometer





General Investigator Program Executed Hours



As of 28 February 2015

	Cycle 1			Cycle 2		
	US (hours)	German (hours)	Total (hours)	US (hours)	German (hours)	Total (hours)
FORCAST	25.8	2.0	27.8	97.8	0.0	97.8
GREAT	39.3	35.6	74.9	19.1	15.5	34.6
FLITECAM	0.0	0.0	0.0	4.5	0.0	4.5
FLIPO	2.9	0.0	2.9	1.8	1.8	3.6
FIFI-LS	0.0	0.0	0.0	2.2	4.7	6.8
EXES	0.0	0.0	0.0	0.0	0.0	0.0
Total	68.0	37.6	105.6	125.4	22.0	147.4





Cycle 2 Awards

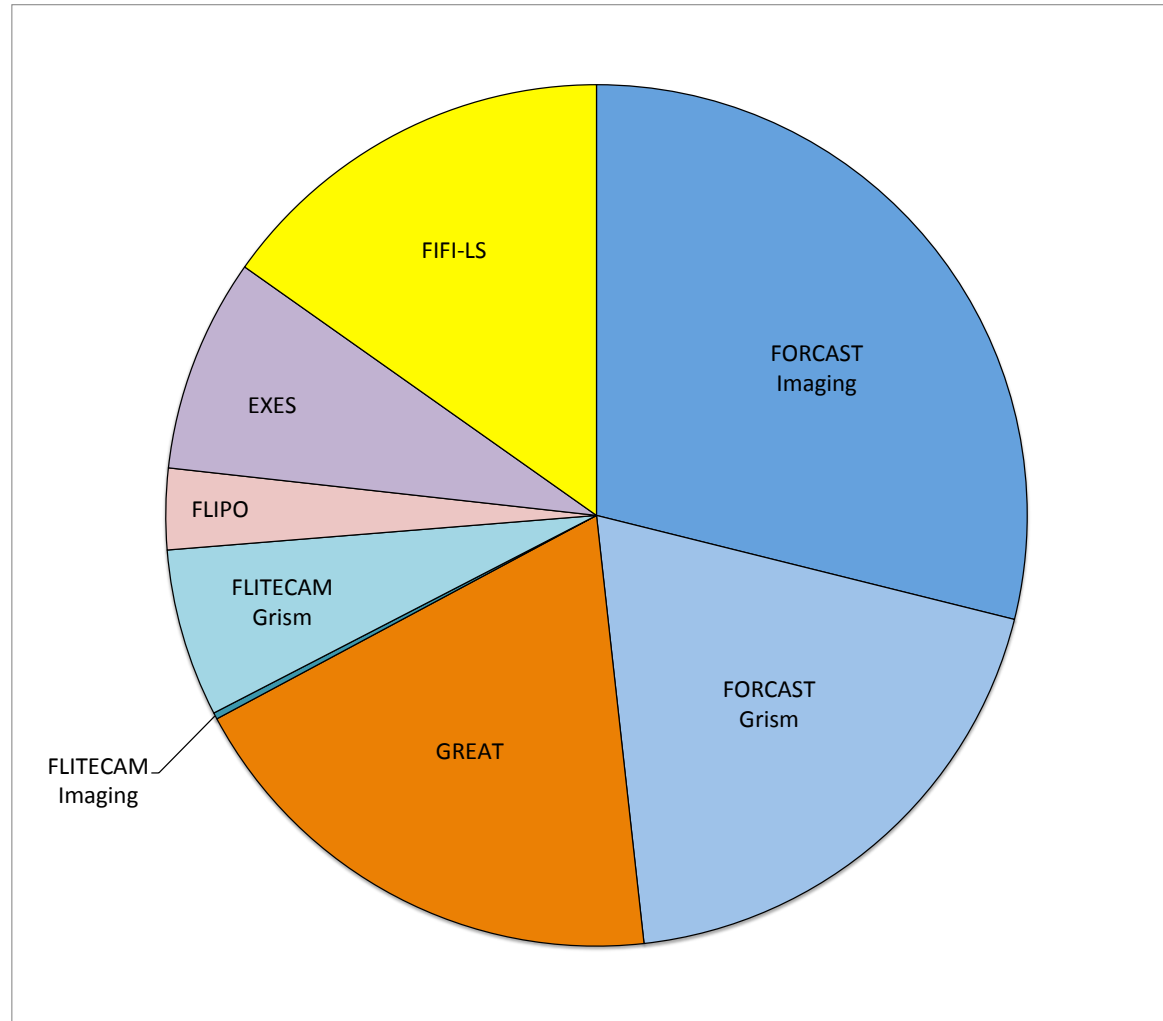


Instrument	US Queue	German Queue	Total
EXES	7.8	0.0	7.8
FIFI-LS	1.5	3.0	4.5
FLITECAM	10.0	2.2	12.2
FLITECAM/FORCAST	20.1	0.0	20.1
FLIPO	8.0	5.3	13.3
FORCAST	95.9	0.0	95.9
GREAT	21.8	30.3	52.1
Total	165.1 hours	40.8 hours	205.9 hours
Number of Teams Awarded Time	30 US GI + 7 International	14 German GI + 1 DSI Staff	





Cycle 3 Awarded Time Distribution



407.8 Hours US + 45.8 Hours DE = 453.8 Hours Total

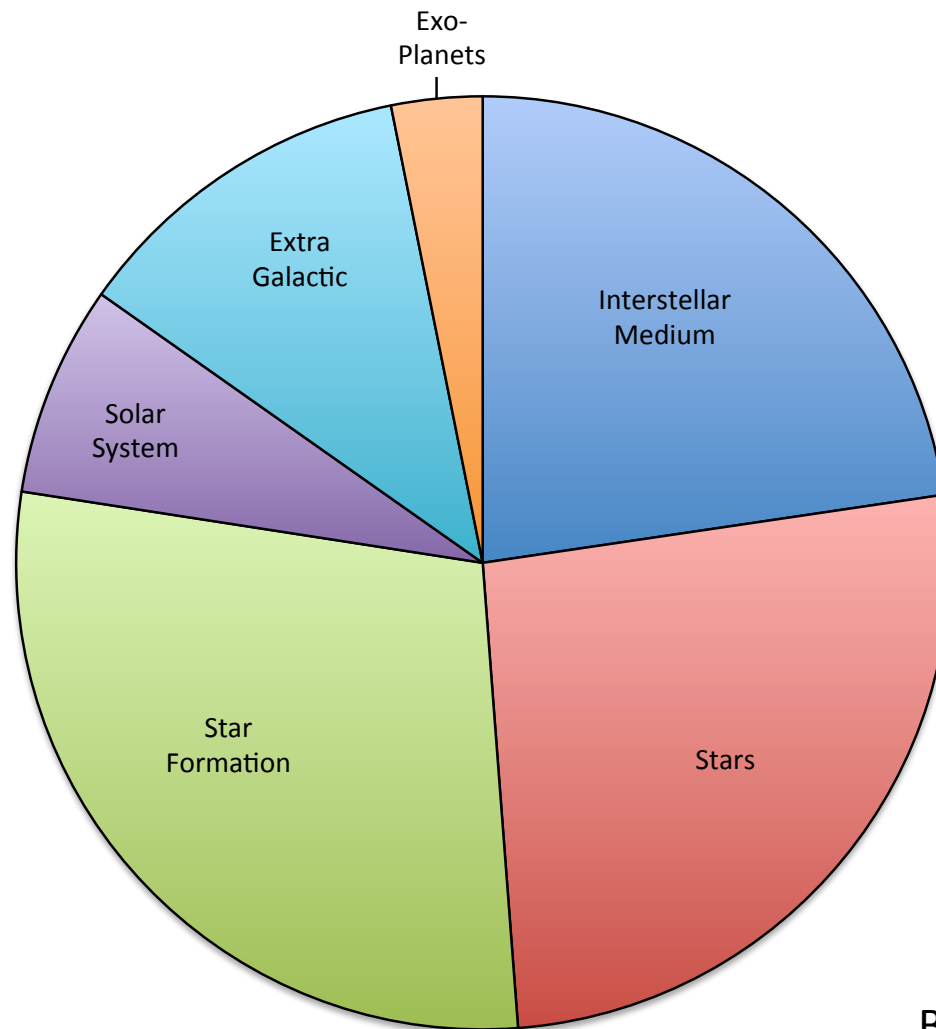


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Cycle 3 – Awarded Science Areas



By Hours



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Aggregate GI Statistics



	Cycle 1 (hours)	Cycle 2 (hours)	Cycle 3 (hours)
US Awards	134.7	165.1	407.8
US Observed	68.0	116.3	
DE Awards	46.6	42.4	45.8
DE Observed	37.6	15.7	

- Notes:
- 1) Times do not include GTO observations.
 - 2) Cycle 2 statistics are up to H MV.
 - 3) Cycle 3 hours include 59.27 hours of “Do If Time” observations.





Cycle 3 General Investigator Executed Hours



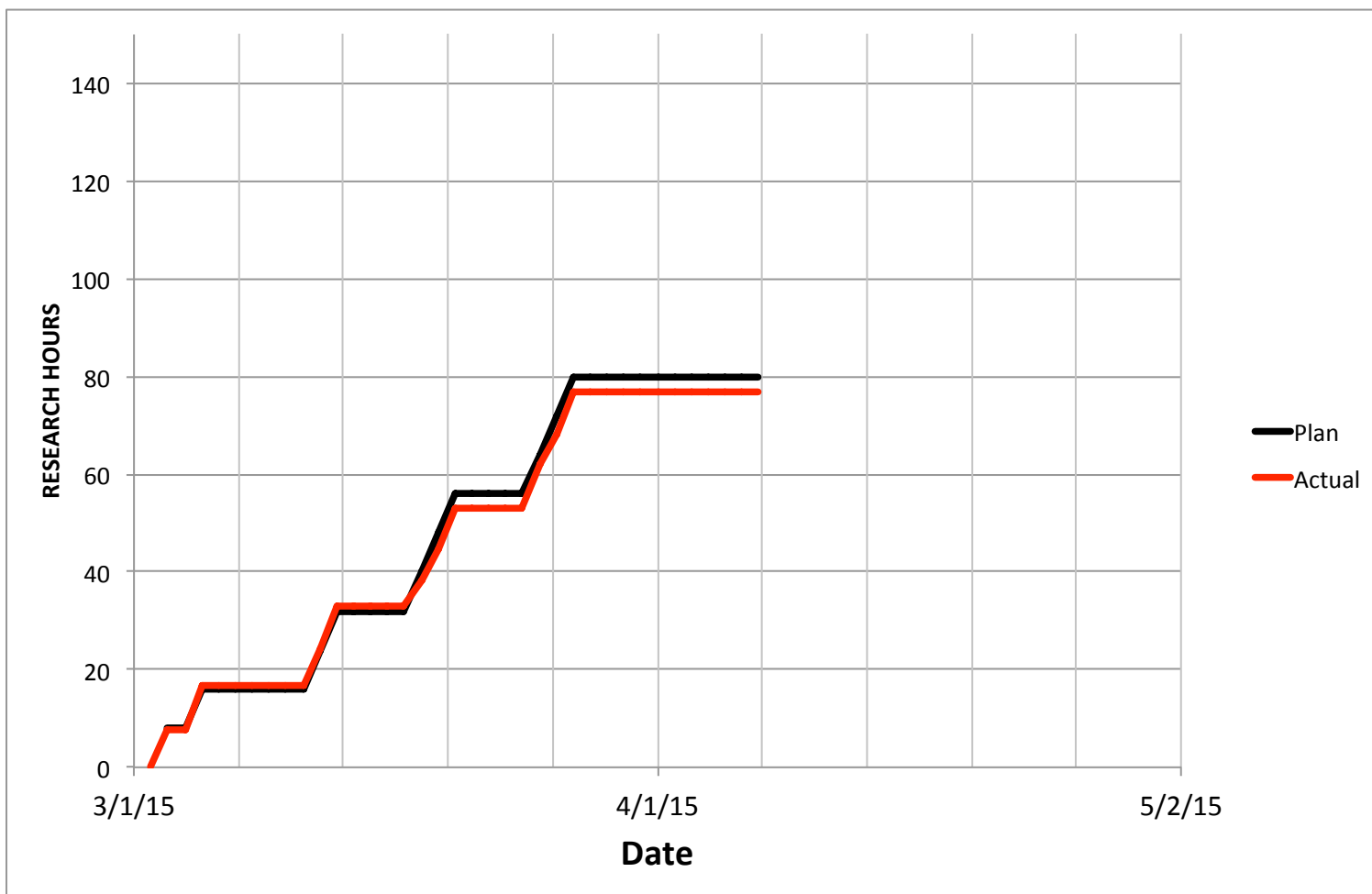
As of 6 April 2015

	Cycle 3		
	US (hours)	German (hours)	Total (hours)
FORCAST	0.7		0.7
GREAT			0.0
FLITECAM			0.0
FLIPO			0.0
FIFI-LS	36.3	7.8	44.1
EXES	3.4	3.9	7.2
Total	40.4	11.7	52.0





Cycle 3 Cumulative Research Hours





Guaranteed Time Usage



As of 6 April 2015

Instrument	Original Allocation (hrs)*	Observing Time Used (hrs)	Remaining Guaranteed Time (hrs)
FORCAST	50	23.3	26.7
FLITECAM	25	1.9	23.1
HIPO	15	5.5	9.5
FLITECAM+HIPO	25	0.0	25.0
EXES	30	21.4	8.6

* Science Utilization Policies, SOF-DF-PLA-1087 v. 2.4 (2008)





Optimizing the SOFIA Program



- Research Hours alone are not the measure of scientific productivity
 - Maximizing hours comes at a cost
 - There are clear breakpoints in the cost vs. hours relationship
 - Costs are driven by staffing and are quantized by operational crews
- Improvements to SOFIA observatory capabilities and performance need to be closely tied to scientific needs
- It is now recognized that one of the major impediments to productivity has been the low level of funding to General Investigators
- Instrumentation advances can bring substantial improvements in SOFIA productivity

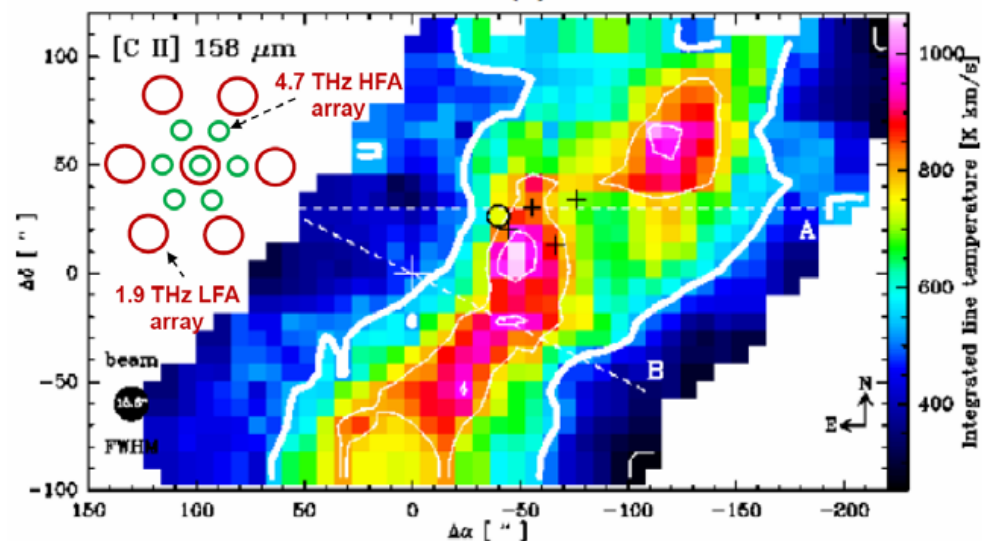




Multi-pixel Heterodyne Arrays Multiply Mapping Speed



- upGREAT an enhancement of the GREAT heterodyne instrument is under development by Rolf Güsten and collaborators.
- Compact heterodyne arrays
 - 7 pixels x 2 polarizations @ 1.9 to 2.5 THz
 - 7 pixels @ 4.7 THz [O I]
- Will be more than an order of magnitude faster than the current instrument
- First light planned for May 2015



Map of M17 SW in the 1.9 THz [C II] Line
(Pérez-Beaupuits et al., 2012)



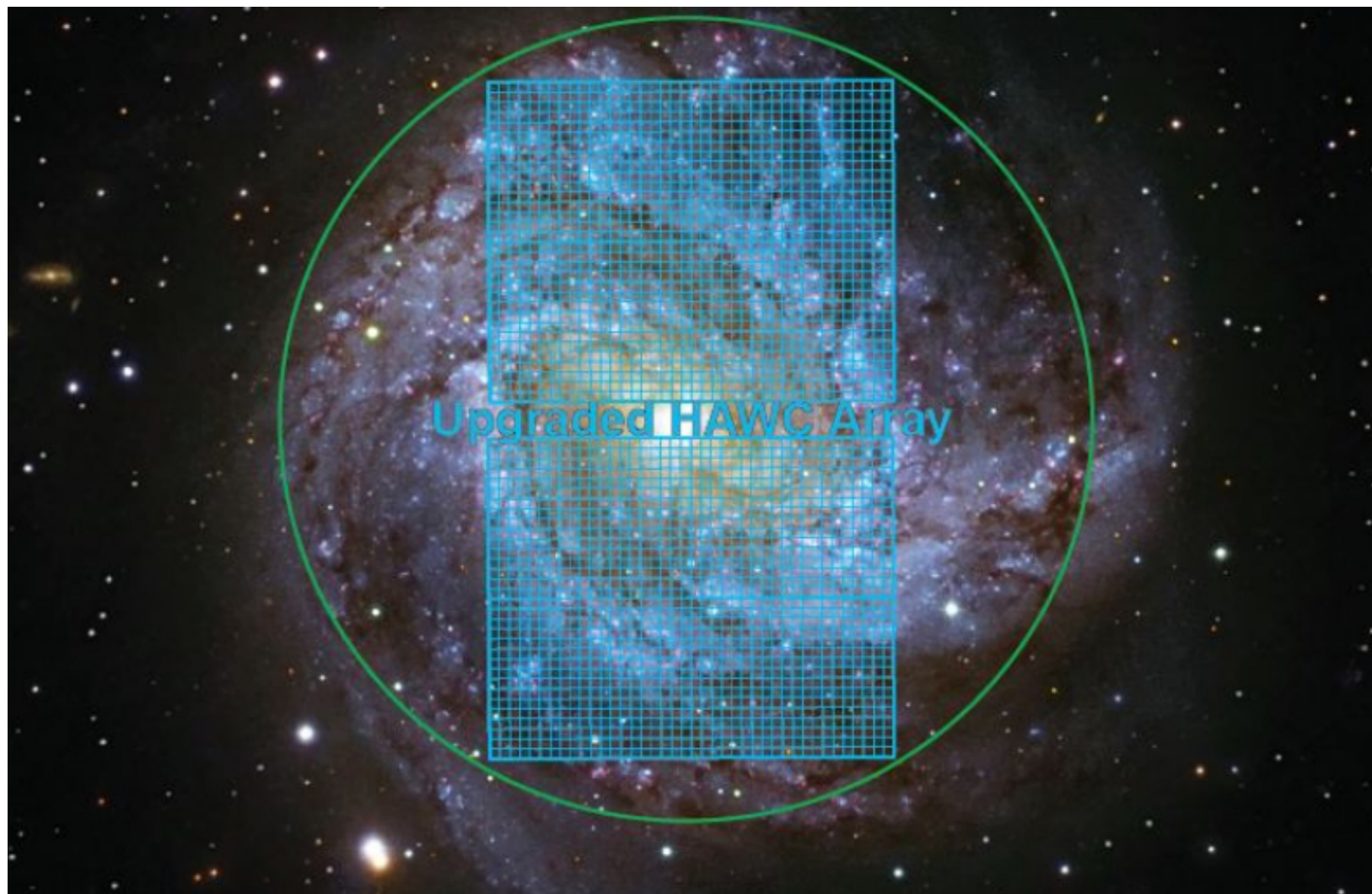


HAWC 12 x 32 Detector Coverage





HAWC+ 64 x 40 Detector Coverage



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Johannes Staguhn





Optimization Activities



- FY 2016 budget plan is being presented to NASA HQ today
- The plan includes many elements to address the optimization of the program
 - Details will be presented to the SUG at the appropriate time in the budget cycle
 - NASA HQ has committed to a Gen 3 instrument development
- To successfully pass the Senior Review, an optimized program plan will need to be developed

