Astrophysics Division

Astrophysics Research Programs

NASA Advisory Council
Astrophysics Subcommittee

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Research Program Manager
Astrophysics Division

Astrophysics ROSES competitions

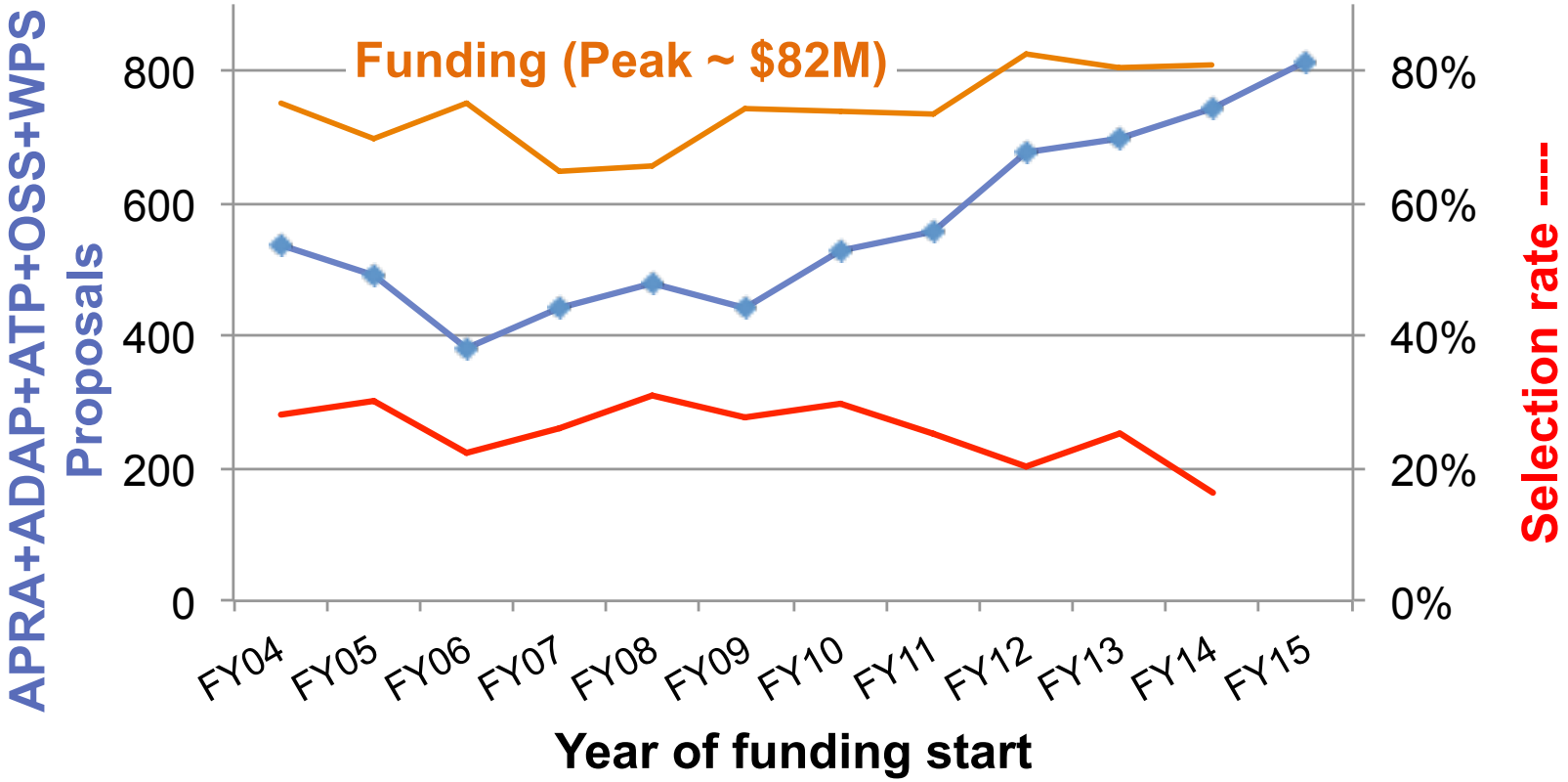
ROSES-2014	Due Date	Notification	Days from due date	Rec'd		Selected	Success	Year-1 Award $M
WFIRST Preparatory Science	11-Jul-14		31	53				
Astrophysics Theory	11-Jul-14		31	216	↑↑			
Exoplanet Research Program Step 2	23-May-14		80	64	↑↑			
Astrophysics Data Analysis	16-May-14		87	302	↑			
ROSES-2013								
Strategic Astrophysics Technology	21-Mar-14		143	18	↓			
Astrophysics Research and Analysis	21-Mar-14		143	177	→			
Elements with NEW STARTS IN FY15				830				
Roman Tech Fellowships: Stage 2	1-Feb-14	21-Apr-14	79	2		1	50%	0.3
Fermi Guest Investigator -- Cycle 7	31-Jan-14	23-Jun-14	143	222	→	44	20%	4.0
Swift Guest Investigator -- Cycle 10	26-Sep-13	18-Dec-13	83	175	↑	45	26%	1.2
Astrophysics Theory	12-Jul-13	9-Dec-13	150	181	→	27	15%	3.9
Origins of Solar Systems	23-May-13	7-Nov-13	168	39	→	7	18%	0.9
Astrophysics Data Analysis	17-May-13	30-Oct-13	166	276	→	41	15%	4.5
ROSES-2012	*							
Strategic Astrophysics Technology	22-Mar-13	13-Sep-13	175	38	↓	9	24%	5.2
Astrophysics Research and Analysis	22-Mar-13	11-Sep-13	173	178	↑	37	21%	13.9
Elements with NEW STARTS IN FY14		weighted mean =	147	1111		211	**19%**	33.8
Core (Non-GO) solicitations			164	714		122	**17%**	28.6
Guest Observer solicitations			117	397		89	**22%**	5.2

Astrophysics R&A budget keeps FY12 gains…

Amounts in $k	FY07 Final	FY08 Final	FY09 Final	FY10 Final	FY11 Final	FY12 Final	FY13 Final	FY14 Enacted	FY15 Request
Particle Astro	$ 7,631	$ 6,672	$ 8,201	$ 8,260	$ 8,243	$ 9,375	$10,545	$ 8,265	
High Energy	$12,782	$12,406	$13,886	$14,110	$13,911	$14,950	$14,270	$13,846	
UV/Opt/IR/ Sub-mm	$17,442	$19,094	$22,353	$21,534	$21,295	$23,385	$21,939	$21,781	
Fundamental Physics: in PCOS FY10-11, now				$ 968	$ 613	$ 860	$ 741	$ 859	
APRA Total	$37,856	$38,172	$44,441	$44,872	$44,062	$48,570	$47,495	$44,752	
Orig Solar Systems	$ 3,673	$ 2,965	$ 3,000	$ 2,807	$ 2,944	$ 3,244	$ 3,500	$ 3,700	
Astro Theory Program	$10,227	$11,696	$11,890	$12,262	$12,148	$11,811	$11,560	$12,500	
TCAN with NSF								$ 1,500	
Tech Fellows						$ 538	$ 975	$ 1,200	
Other	$ 394	$ 594	$ 670	$ 673	$ 641	$ 2,008	$ 1,508	$ 2,123	
R&A (399131)	$52,150	$53,426	$60,000	$59,646	$59,611	$66,172	$65,038	$63,275	$66,030
ADAP/LTSA	$12,641	$12,013	$14,384	$13,258	$14,132	$16,365	$16,929	$17,008	$16,983
Core R&A	$64,791	$68,891	$74,826	$73,872	$73,927	$82,537	$81,967	$82,783	$83,013
ASMCS (399131)	$ 3,452	$ 442				WFIRST support		$ 2,502	
TOTAL ($M)	**$64.79**	**$68.89**	**$74.83**	**$73.87**	**$73.93**	**$82.54**	**$81.97**	**$82.78**	**$83.01**
	15% cut from FY06	partial recovery	more R&A recovery	flat	flat	growth!		growth	retained!

Funding is up almost 30% since 2007… so why are ROSES selection rates falling?

…but proposal numbers grow faster than $$



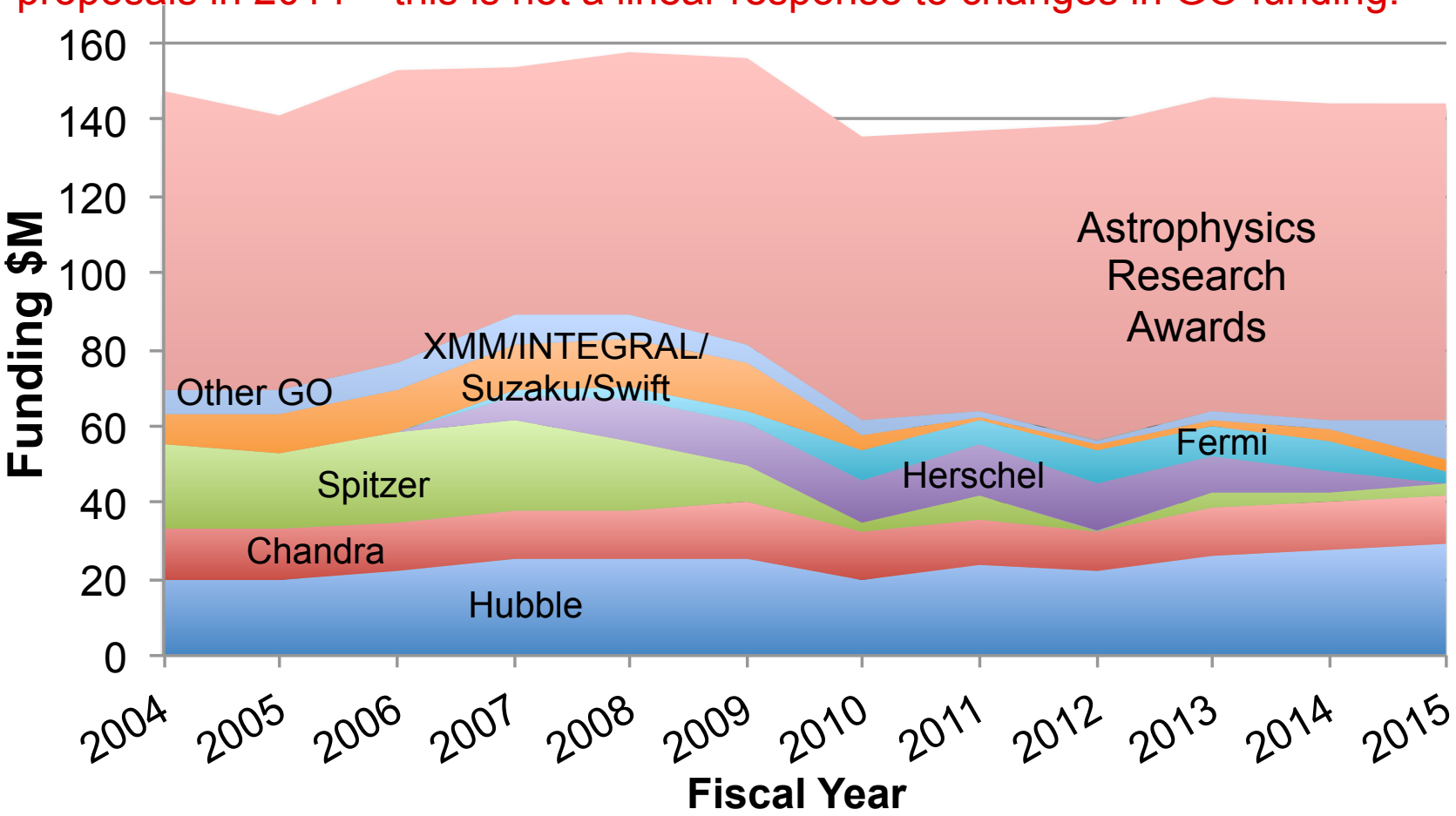
In FY13 the Astrophysics Research Program received twice as many proposals as in 2006.

Funding for the program has risen 25% since 2006, but it has not doubled; so the success rate has fallen.

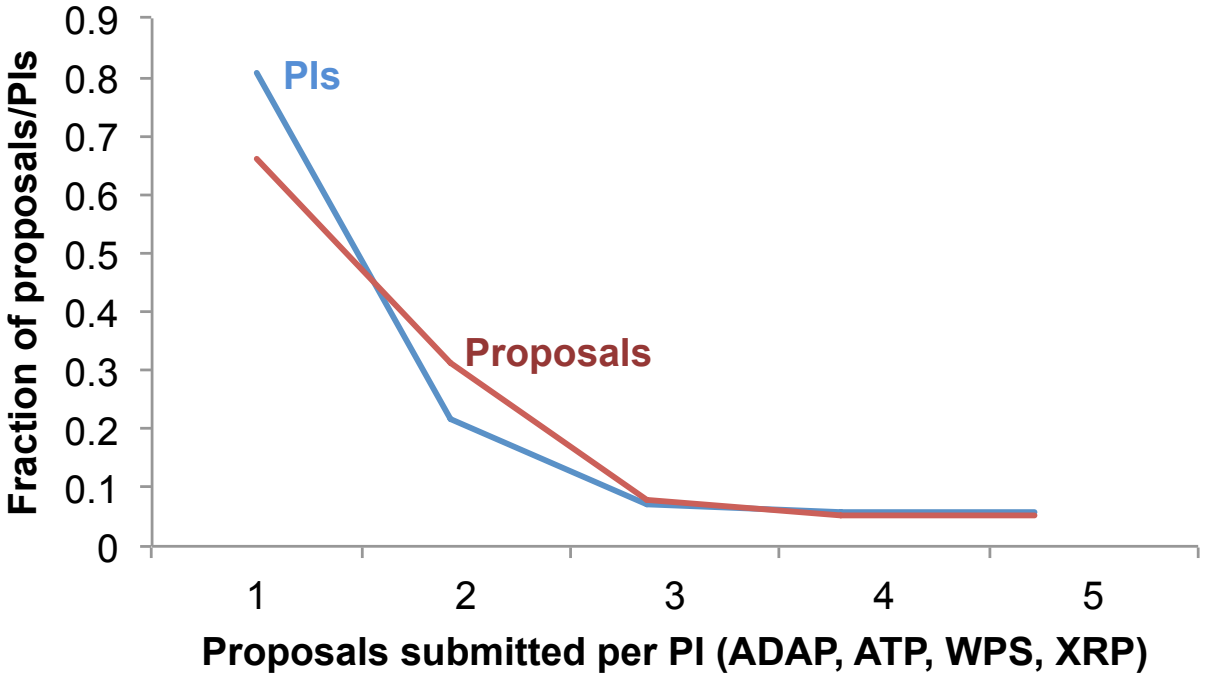
Total funding per successful proposal has been steady at $500k-$600k – this is an average over theory investigations, flight payloads, etc.

Research awards and GO funding

Guest Observer funding peaked in 2007-9, then fell after Spitzer's cold mission. Total of GO+R&A peaked in FY08; from FY12, increased R&A funding has partly offset GO decrease. Total funding is now 92% of FY08 peak, 7% above FY10.
GO funding was the same in FY10 as in FY14, but we received 50% more R&A proposals in 2014 – this is not a linear response to changes in GO funding!



PIs submitting multiple proposals in 2014



For the ADAP, ATP, WPS and XRP competitions in 2014, Astrophysics received 635 total proposals. Most proposals (420, or 66%) were submitted by a PI who sent in no other proposal to these competitions.

91 PIs submitted 2 proposals, and 10 PIs submitted 3 or more. If these PIs had written only one proposal each, we would have had only 82% as many proposals – selection rates would be 20% higher.

NSF AST will ask PIs to submit no more than one proposal each to AAG in 2014

Proposing organizations in 2014

For the ADAP, ATP, WPS and XRP competitions in 2014, Astrophysics received 635 proposals; 602 of these came from 137 identifiable organizations.

Half of the proposals came from 25 organizations; the 12 organizations submitting the largest number accounted for about 1/3 (34%) of the total.

This information is time-consuming to assemble, because PIs give the organization name in different forms, some leave the “company” name blank, others fill in their department name…

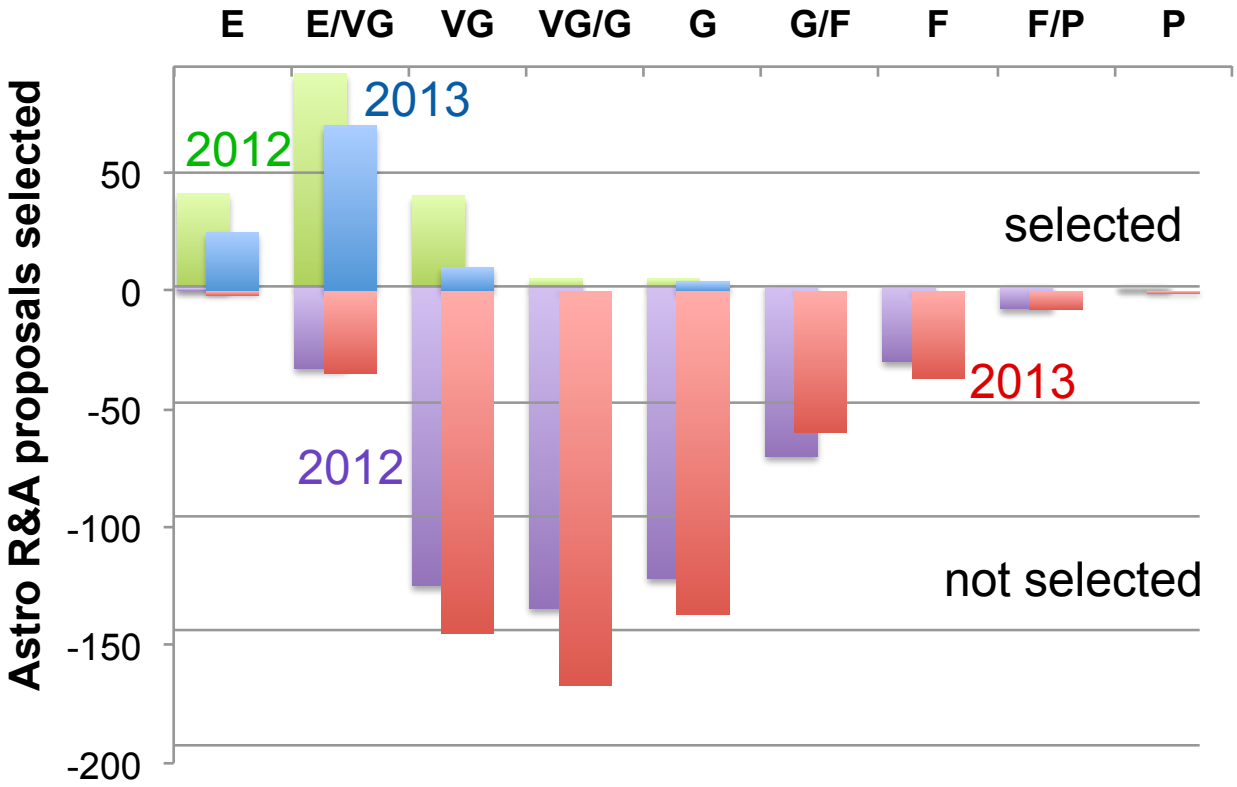
ADAP, ATP, WPS, XRP proposal submissions, by organization

NASA Goddard	32
Harvard-Smithsonian CfA	24
University of Arizona	24
JPL	23
Caltech	22
University of Michigan	17
Penn State University	15
University of Colorado	15
Arizona State U	12
Columbia/Princeton/ UHawaii	11

No decisions have yet been made for these proposals.

ROSES success rates are published, and updated on the web.

Astrophysics ROSES selections by rating



Of 726 proposals to the Astrophysics core R&A program (ADAP, APRA, SAT, ATP, OSS) in 2012, 25% were selected (green); 75% were declined (purple). Of 339 proposals rated VG or better, 51% were selected.

Of 713 proposals to these programs in 2013, 17% were selected (blue); 83% were declined (red). Of 299 proposals rated VG or better, 39% were selected.

The cost of proposal competition

To review the 1583 ROSES proposals submitted to Astrophysics in 2013, we held 70 review panels with 450 reviewers.

As an example, calculate the cost of the ATP-13 competition under the assumptions that

- Each proposal takes about a person-month to prepare and submit
- Serving on a review panel takes about 2 working weeks (prep work, travel, panel time)
- A typical proposing scientist's time costs $20,000/month including benefits and indirect costs

For the 180 proposals submitted to ATP-13, the time spent by the proposers and our 80 panelists, plus travel, hotel, etc., added to roughly $5M.
In response to the review, we selected 15% of the proposals, awarding $3.8M in year-1 funds and a total of $11.2M.

If proposal numbers doubled again, then funds awarded would be roughly equal to the amount spent on preparing proposals and reviewing them. Beyond that, the process would be endothermic: proposing and reviewing would consume more resources than can be won. We want to stay away from that!

Proposal information for ApS and AAAC

The Astronomy and Astrophysics Advisory Committee also plans to study causes and effects of the decreasing success rates for proposals for support to individual investigators and smaller projects. What data can NASA supply?

These data could be extracted from NSPIRES by competition, for 2007 and later:
— numbers of proposals received and selected: this information is already published
— total funding requested (civil servant labor estimated) and awarded at selection (later augmentations not included)
— success rate as a function of proposal budget (our prior studies found no correlation)
— total proposal budget, funds requested as salary for senior personnel, whether a student is included in the budget (software development would be required)
— success rate by institution (much human intervention required)

These data would be badly incomplete:
— proposals submitted by a given researcher over multiple years (NSPIRES does not follow submissions by PI; those moving to a new organization often make new accounts)

NSPIRES does not collect this information at all:
— gender, PhD year, academic status of the PI or other team members, except for members identified in roles as postdocs or students
— number of senior researchers on a proposal

How to reduce the burden?

Thoughts of a harried program manager…

- Almost no proposals rated below VG are selected. Should a PI who proposes in two consecutive years, with no proposal rated better than G, be asked to sit out for a year? (Roughly 1/3 of Astrophysics R&A proposals were rated G or below in 2012-3.)
- Should each PI be restricted to one proposal per year on average: e.g. three in any 3-year period across Astrophysics R&A competitions?
- Should we run some of our competitions in alternate years? We would receive more proposals on each cycle, but likely not twice as many.
- Should organizations be restricted in the number of proposals they can submit (as for some NSF competitions)? Scrutiny at the institution might also improve proposal presentation, reducing the burden on reviewers.
- Other ideas??

Backups

Lookback: Astrophysics ROSES competitions

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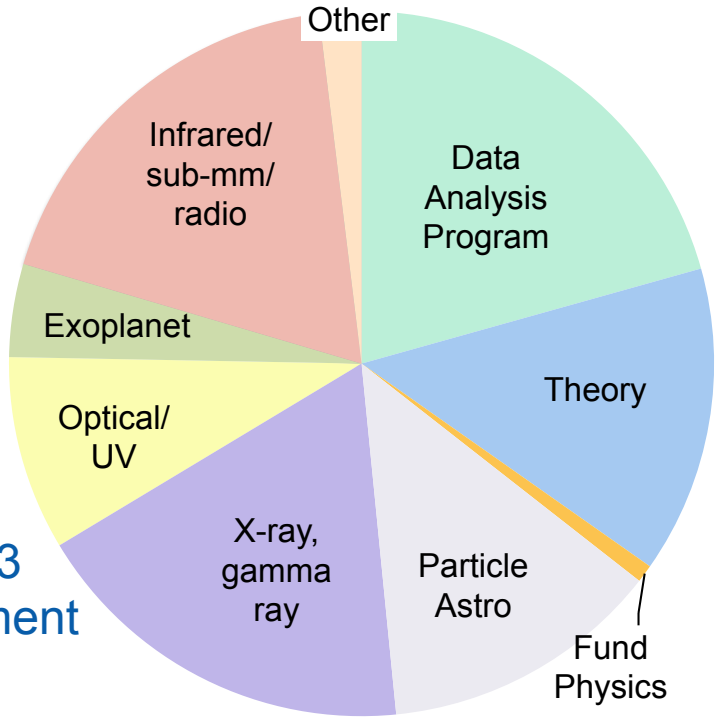
Guest Observer solicitations			117	397		89	**22%**	5.2
Kepler Participating Scientists	1-Mar-13	5-Jul-13	126	30	→	11	37%	1.0
Theory & Comp Networks (with NSF)	14-Feb-13	20-Jun-13	126	106		10	19%	1.5
Roman Tech Fellowships: Stage 2	1-Feb-13	29-May-13	117	3		2	67%	0.6
Fermi Guest Investigator -- Cycle 6	18-Jan-13	16-May-13	118	233	→	50	21%	3.8
Kepler Guest Observer -- Cycle 5	18-Jan-13	15-Apr-13	87	63	→	25	40%	--
Roman Technology Fellowships	8-Nov-12	5-Mar-13	117	12	→	2	17%	0.4
Swift Guest Investigator -- Cycle 9	26-Sep-12	18-Dec-12	83	158	→	45	28%	1.2
Euclid Science Team	31-Aug-12	7-Nov-12	68	8		3	38%	--
Astrophysics Theory	13-Jul-12	6-Dec-12	146	181	→	28	15%	3.9
Origins of Solar Systems	25-May-12	18-Oct-12	146	46	↑	12	26%	1.8
Astrophysics Data Analysis	18-May-12	17-Sep-12	122	291	→	90	31%	8.7
ROSES-2011								
Strategic Astrophysics Technology	23-Mar-12	30-Aug-12	160	48		10	21%	8.0
Astrophysics Research and Analysis	23-Mar-12	3-Aug-12	133	162	→	43	27%	11.7
Elements with NEW STARTS IN FY13		weighted mean =	122	1341		331	**25%**	42.6
Core (Non-GO) solicitations			133	849		197	**24%**	36.6
Guest Observer solicitations			102	492		134	**27%**	6
Fermi Guest Investigator -- Cycle 5	20-Jan-12	1-May-12	102	224	→	67	30%	5.4
Kepler Guest Observer - Cycle 4	20-Jan-12	27-Apr-12	98	61	↑	21	34%	1.0
Roman Technology Fellowships	18-Nov-11	7-Mar-12	110	16		3	19%	0.6
Swift Guest Investigator -- Cycle 8	28-Sep-11	21-Dec-11	84	152	→	32	21%	0.7
Astrophysics Theory	3-Jun-11	28-Oct-11	147	197	→	33	17%	4.4
Origins of Solar Systems	27-May-11	7-Oct-11	133	36	→	5	14%	0.8
Astrophysics Data Analysis	20-May-11	29-Sep-11	132	278	↑↑	60	22%	6.2
ROSES-2010								
Strategic Astrophysics Technology	25-Mar-11	31-Aug-11	159	56	↑↑	18	32%	7.9
Astrophysics Research and Analysis	25-Mar-11	31-Aug-11	159	166	↑↑	40	24%	10.7
Elements with NEW STARTS IN FY12		weighted mean =	126	1186		279	**24%**	37.7
Core (Non-GO) solicitations			144	749		159	**21%**	30.6
Guest Observer solicitations			95	437		120	**27%**	7.1

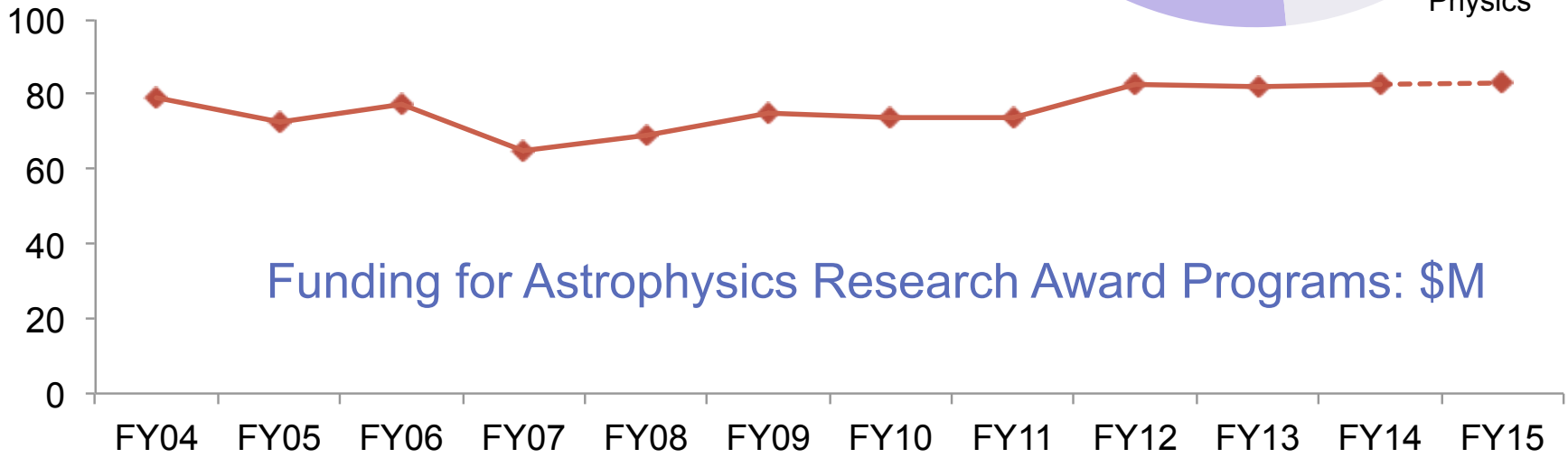
Astrophysics Research Program Funding

Most recent year:

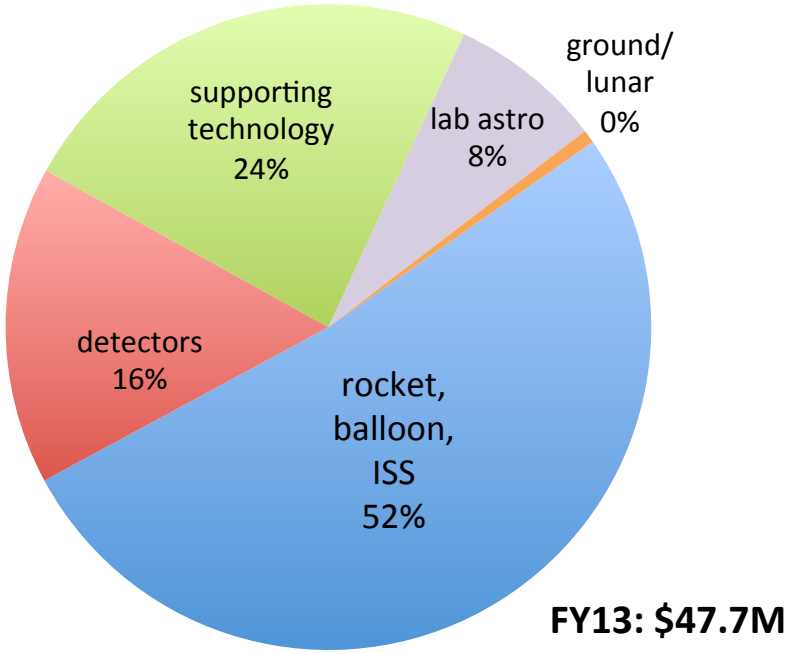
	Proposals Rec'd	Year-1 $M	selected	Success Rate
RTF-12	12	0.6	2	17%
APRA-12	178	13.6	37	21%
SAT-12	38	5.2	9	24%
ADAP-13	276	4.4	41	15%
OSS-13	39	0.9	7	18%
ATP-13	181	3.9	27	15%



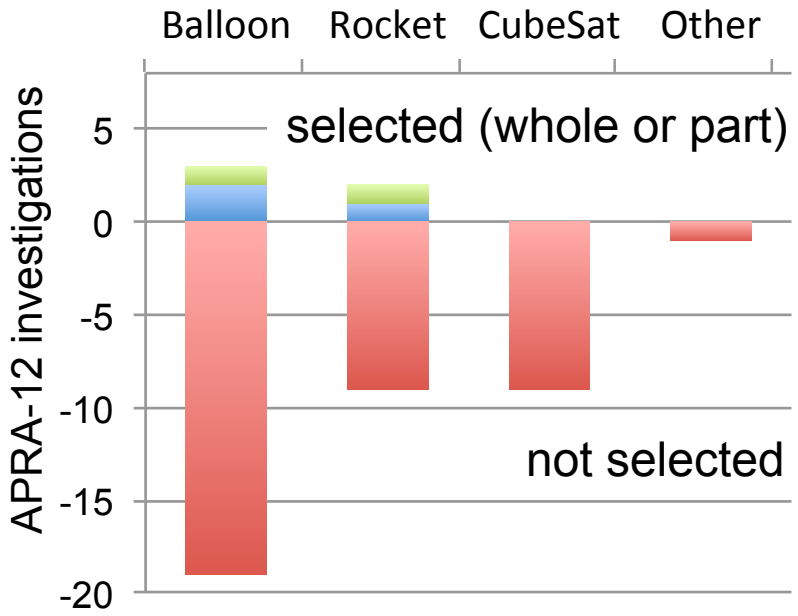
Split of $81.967M spent in FY13
PI award programs + management



APRA (sub)orbital payloads



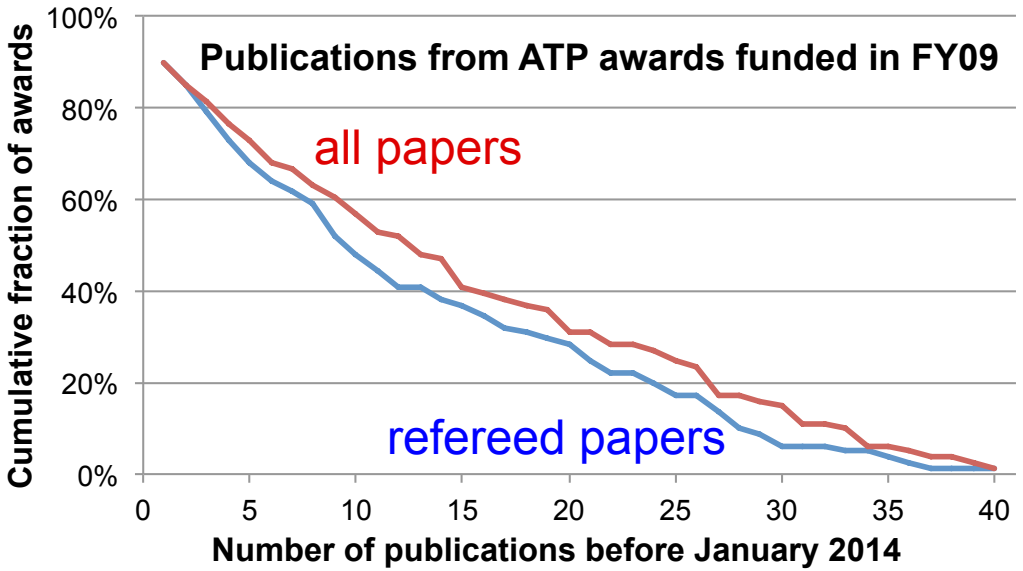
FY13: $47.7M

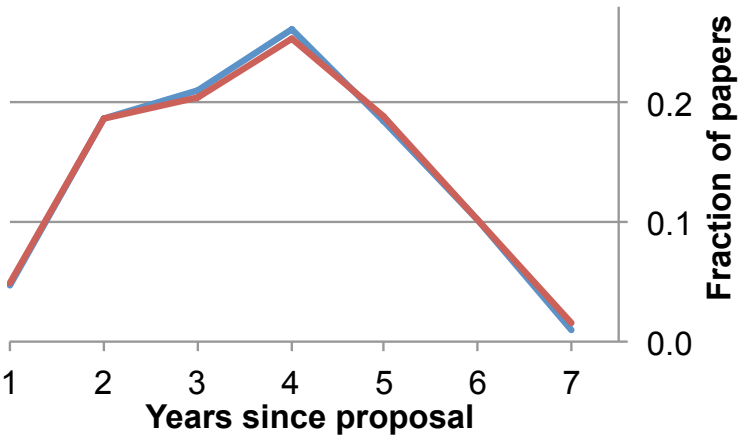


Roughly half of APRA funding is spent on suborbital-class payloads – no significant change over 5+ years.

In APRA-12, 44 investigations were proposed for suborbital-class payloads;
6 of these were selected for full or partial funding.
11 investigations were rated VG or better.

Papers from ROSES awards: an example





Tracking publications by grant or proposal number, through ADS:

10% of those who received ATP funding in FY 2009 failed to include the grant or proposal number in acknowledgment on any publication. Please include this (required) information – help us show the value of these awards!

About 1/3 of all papers that acknowledge an Astrophysics Theory Program award are published more than 4 years later – after the final report is due.