



Groundbased observational campaigns of NEAs

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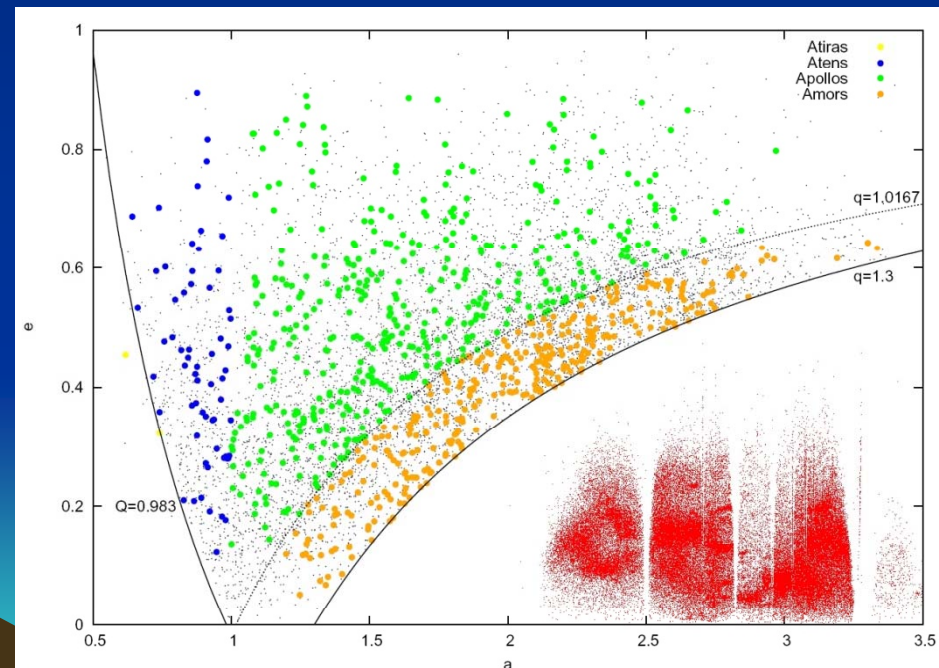
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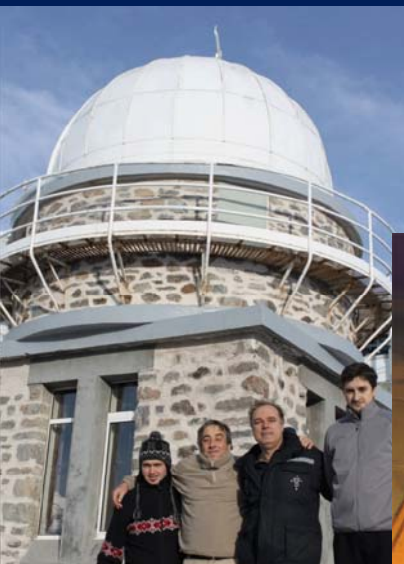
Near Earth Asteroids

Science objectives:

- Confirm NEAs
- Secure orbits (large σ)
- Discoveries
- Astrometry of serendipitously MBAs
- Targets of space missions



Pic du Midi campaigns 2011



Station de Planétologie des Pyrénées



iKon-L Andor 2048 × 2048
7.5 x 7.5 arcmin FOV



Atik 383L+ 3326 x 2504 px
7.8 x 5.8 arcmin FOV



Campaigns

February - March 2011, 5 (2) nights, seeing 0.8 -1.5 arcsec
Limit magnitude 20.5 @ Texp = 180 sec

November 2011, 5 (4) nights, seeing 0.8-2 arcsec
Limit magnitude 20 @ Texp = 180 sec

R & V filter

Astrometry - main objective

Photometry - (175706) 1996 FG3

RESULTS

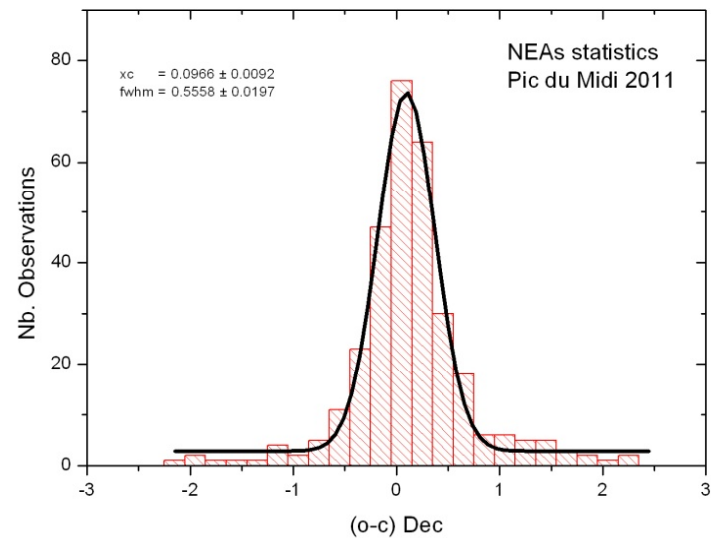
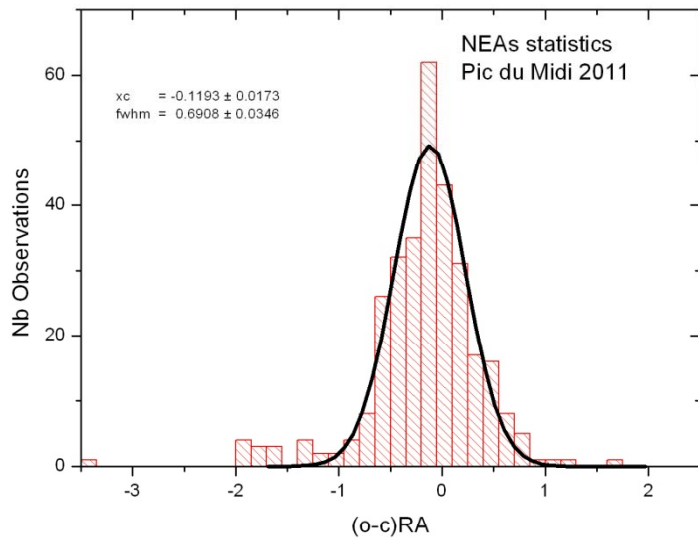
Pic du Midi	2010 RO82	NEA	2011 Mar 02	19.0	120	8	2.9	4m/6m
	2000 EB14	NEA	2011 Mar 02	20.3	300	12	6.9	11y/11y
	2011 ET4	NEA	2011 Mar 02	18.5	60	10	7.4	1d/1d
	2011 ES4	VI	2011 Mar 02	20.4	180	10	7.2	1d/2d
	2007 ES	NEA	2011 Mar 03	21.3	180	10	1.2	4y/4y
	2011 EW4	NEA	2011 Mar 03	21.4	120	1	2.8	1d/1d
	2010 VN65	NEA	2011 Mar 03	20.8	180	9	1.4	2m/5m
	2011 EX4	NEA	2011 Mar 03	18.8	30	9	8.6	1d/1d
	2011 AF37	NEA	2011 Mar 03	20.1	90	7	1.2	1m/2m
Pic du Midi	2011 PW6	NEA	2011 Nov 17	19.8	300	6	0.3	3m/3m
	2011 OV18	PHA	2011 Nov 17	20.0	300	8	0.5	2y/2y
	2011 WM2	NEA	2011 Nov 17	18.9	120	8	4.0	1d/1d
	2011 WV2	NEA	2011 Nov 17	19.7	300	6	2.5	1d/1d
	(175706) 1996 FG3	PHA	2011 Nov 18	17.0	90	6	6.4	15y/15y
	2011 WW4	NEA	2011 Nov 18	19.9	300	7	0.8	16y/16y
	2011 WV4	NEA	2011 Nov 19	19.0	180	8	2.3	1d/1d
	2011 WU4	NEA	2011 Nov 19	19.6	300	6	3.6	1d/1d
	2008 WZ13	PHA	2011 Nov 19	20.5	300	8	0.6	4m/3y
	2011 WP4	NEA	2011 Nov 19	20.3	300	3	3.4	1d/1d
	2011 UH21	NEA	2011 Nov 19	20.2	300	6	4.0	1m/1m
	2011 VP12	NEA	2011 Nov 19	19.8	300	5	3.8	5d/5d
	(4183) Cuno	PHA	2011 Nov 19	16.4	60	8	1.2	52y/52y
	(308635) 2005 YU55	NEA	2011 Nov 20	17.8	90	8	0.2	6y/6y
	2011 WQ4	NEA	2011 Nov 21	17.3	90	8	76.6	3d/3d
	2011 WK5	NEA	2011 Nov 21	20.1	300	7	2.8	1d/1d
	2011 WV2	NEA	2011 Nov 21	19.7	300	6	2.5	1d/4d
	2001 YE4	NEA	2011 Nov 21	20.2	300	6	1.0	1y/10y
	(4183) Cuno	PHA	2011 Nov 21	16.4	60	6	1.2	52y/52y
	2011 WP4	NEA	2011 Nov 21	18.9	180	6	14.7	3d/3d
	2011 WE32	NEA	2011 Nov 23	19.7	300	5	2.5	1d/1d
	2011 WD39	NEA	2011 Nov 24	20.9	300	3	2.2	1d/1d
	2011 WF32	NEA	2011 Nov 24	20.5	300	3	2.4	1d/1d
	2011 WK5	NEA	2011 Nov 24	19.9	300	6	3.3	1d/4d
	2011 WU4	NEA	2011 Nov 24	19.3	300	6	4.9	3d/6d

2009 ED11	SEB012A	12	Confirmed	MPEC 2011-E12 : 2009 ED11
2011 ET4	SE308D5	10	Confirmed	MPEC 2011-E14 : 2011 ET4
2011 ES4	SEB87C3	10	Confirmed	MPEC 2011-E13 : 2011 ES4
2007 ES	SEB9730	10	Confirmed	MPEC 2011-E11 : 2007 ES
2003 FC49	-	13	-	-
2011 CM17	-	11	-	-
2010 VN65	-	9	-	MPEC 2011-E17 : DAILY ORBIT UPDATE (2011 MAR. 3 UT)
2010 RO82	-	8	-	-
2001 XB232	-	1	-	-
2011 EW4	-	1	-	-
2011 EX4	BY29967	9	Confirmed	MPEC 2011-E19 : 2011 EX4
2011 AF37	-	9	-	-

2011 PW6	-	5	-	-	SPACEGUARD list
2011 OV18	-	8	-	-	SPACEGUARD list
2011 WM2	SW106E5	8	Confirmed	M.P.E.C. 2011-W12	
2011 WV2	SW9FE8F	6	Confirmed	M.P.E.C. 2011-W22	
2011 UU400	SW10DA4	6	Recovered	-	
2011 WP2	SW10C77	7	Recovered	-	
1996 FG3	-	6	-	-	Lightcurve study, * 6 reported
2011 WW4	SW11DEB	7	Confirmed	M.P.E.C. 2011-W29	
2011 WR4	SW11D32	4	Recovered	-	
2011 WV4	SW11DA6	8	Confirmed	M.P.E.C. 2011-W28	
2011 WU4	SWA103D	6	Confirmed	M.P.E.C. 2011-W27	
2008 WZ13	-	8	-	-	MPC Bright List, was at 186" sky plane error
2011 WS4	SWA184E	8	Recovered	-	
2011 WP4	SWA14E1	3	Confirmed	M.P.E.C. 2011-W25	
2011 UH21	-	6	-	-	
2010 GA3	SW9DBB1	3	Recovered	-	
2011 VP12	-	7	-	-	SPACEGUARD list
4183 (Cuno)	-	8	-	-	Lightcurve study
2005 YU55	-	8	-	-	Lightcurve study Francois
2011 WR5	SWA2662	3	Recovered	-	
2011 WQ4	-	8	-	-	Lance Benner(Arecibo) required for radar study
2011 WK5	P101Nic	7	Confirmed	M.P.E.C. 2011-W33	
2008 UC90	P101Njm	8	Recovered	-	
2011 WV2	-	6	-	-	SPACEGUARD list
2001 YE4	-	6	-	-	MPC Bright List, was at 186" sky plane error
4183 (Cuno)	-	6	-	-	Lightcurve study
2011 WL5	P101Nin	8	Recovered	-	
2011 WO5	P101Nim	8	Recovered	-	
2011 WP4	-	6	-	-	SPACEGUARD list
2011 WO15	SW17A25	5	Recovered	-	
2011 WR29	SWA6E4A	7	Recovered	-	
2011 WE32	SW17C41	5	-	M.P.E.C. 2011-W44	
2011 WD39	SWA693C	3	-	M.P.E.C. 2011-W42	
2011 WF32	SWA69D2	3	-	M.P.E.C. 2011-W45	
2011 WK5	-	6	-	-	SPACEGUARD list

Groundbased obs of NEAs, Paris 19-21
Sept 2012

Statistics astrometry



Photometry 1996 FG3



FOV ~ 6x7 arcmin

CCD: ATIK-383L + Broad band filter

Texp= 15 sec

High speed readout (<1sec)

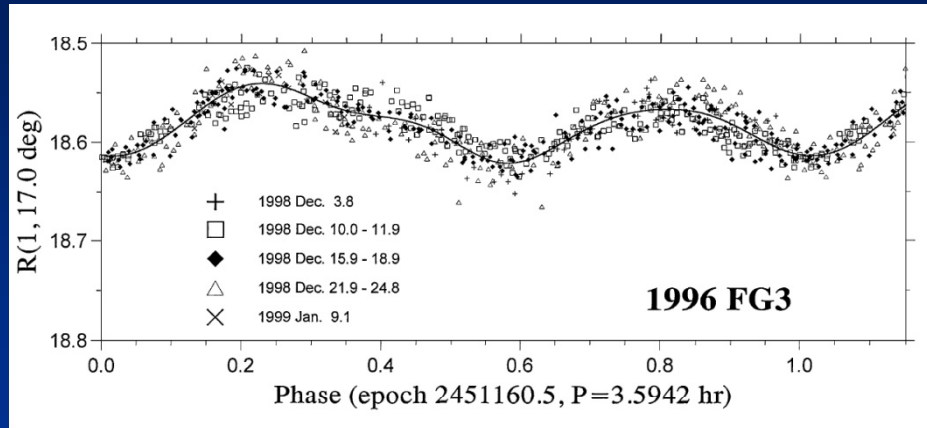
Mast = 15.6 (Nov 23, 2011)

Astrometry (ex: MPEC 2011-W23)

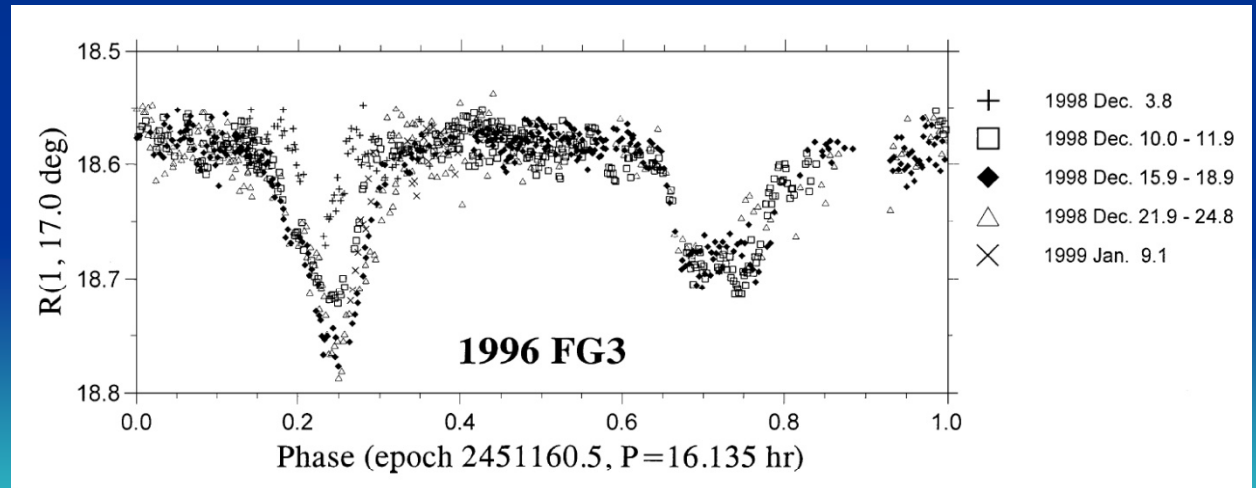
Differential photometry + concatenation
of measurements



1996 FG3 is binary

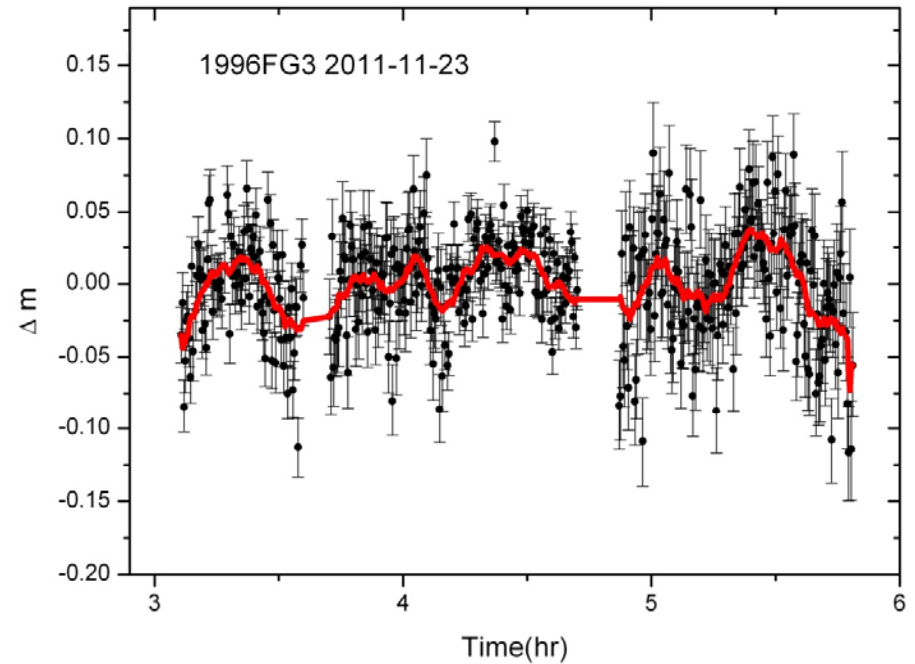
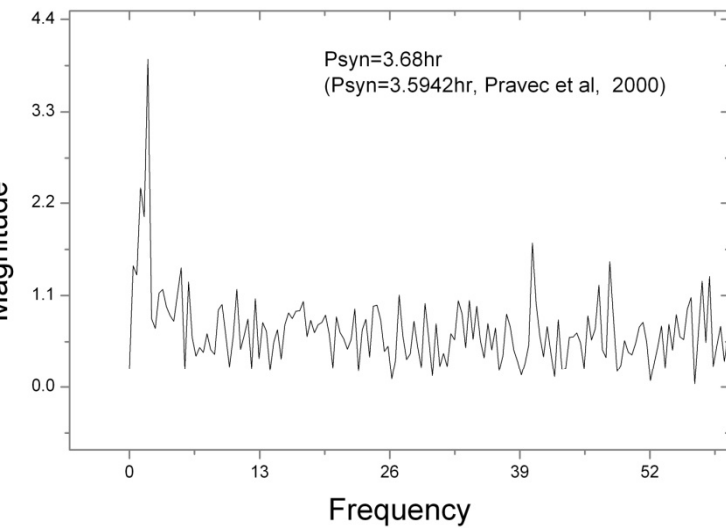
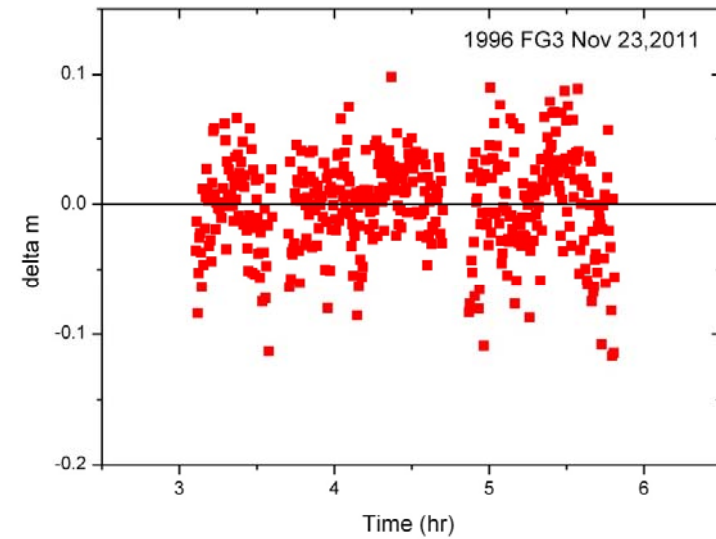


Pravec et al Icarus, 146, 2000

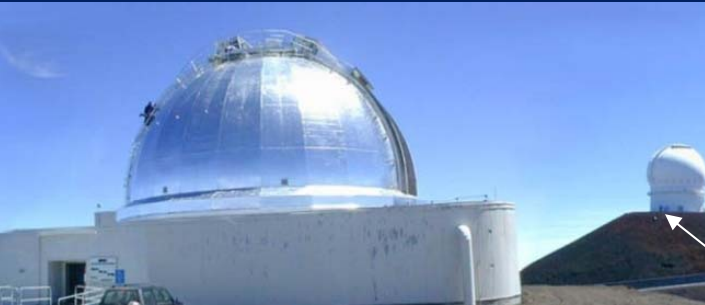


Photometric calibration of ATIK ?

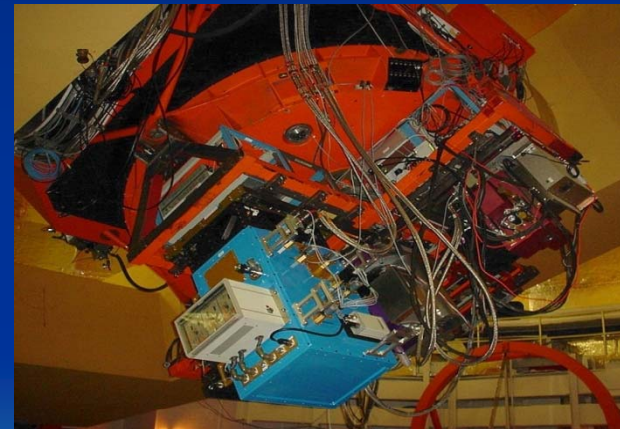
Pic du Midi – 4 hours of observations



WMAP tracking IRTF/CODAM (GBOT request)



IRTF
3m telescope



SpeX

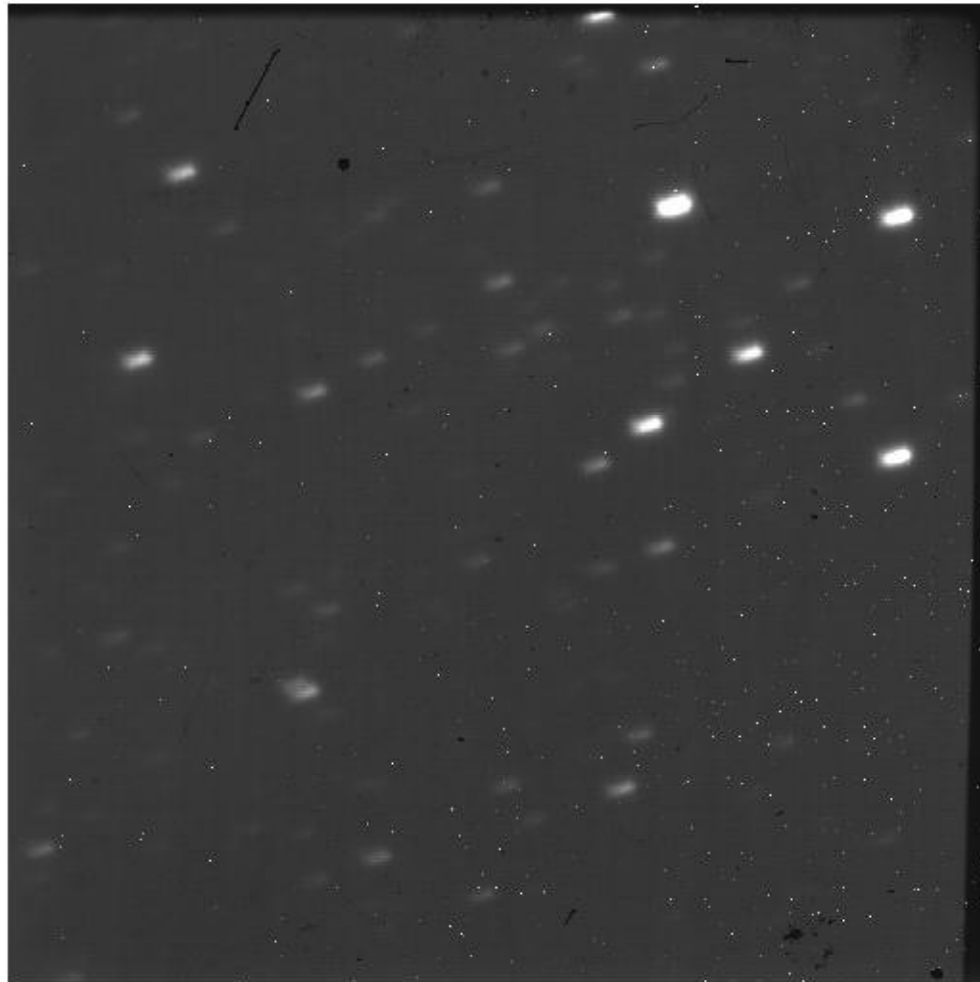


Videoconferencing system

Spectrograph
acquisition terminal

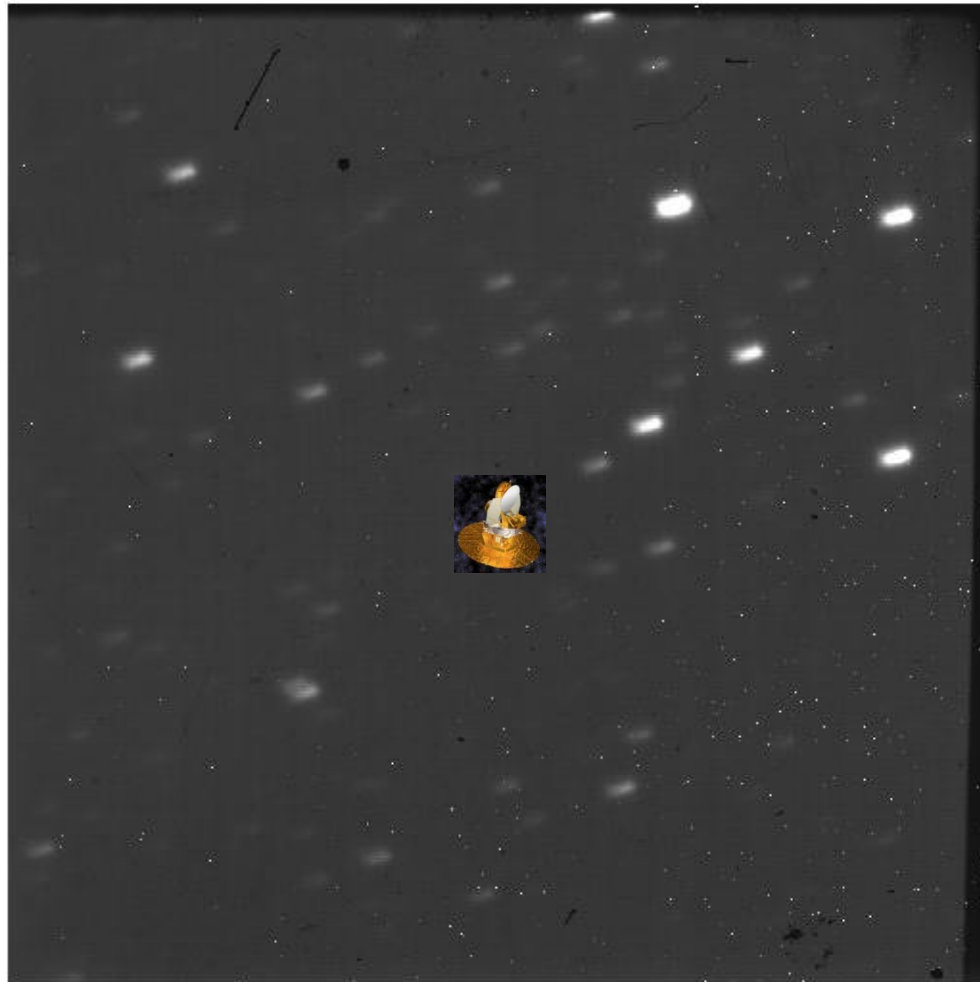
Guiding camera
display

Image taken with spectrograph guider camera, June 26, 2009
FOV 30 x 30 arcsec, K- band (2.2 μm), ltime: 120sec
WMAP – located in L2



0 20000 40000 60000 80000 100000 120000 140000 160000

Image taken with spectrograph guider camera, June 26, 2009
FOV 30 x 30 arcsec, K- band (2.2 μm), ltime: 120sec
WMAP - Unsuccessful observations



0 20000 40000 60000 80000 100000 120000 140000 160000