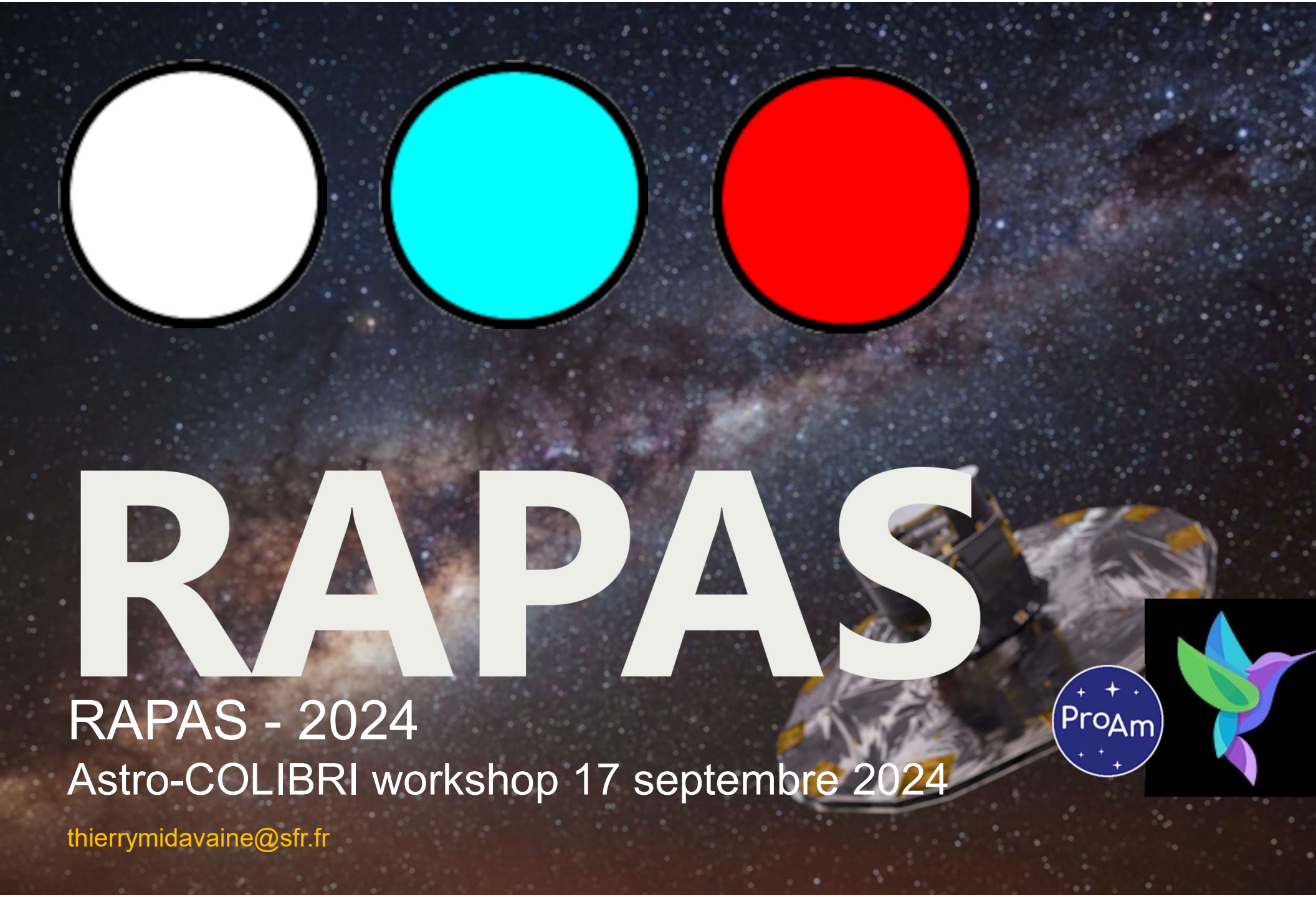


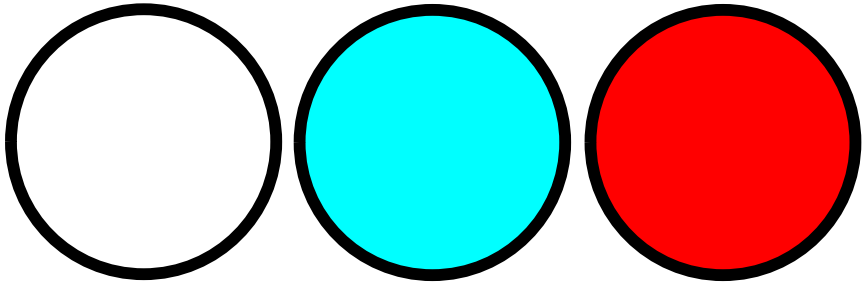
RAPAS - 2024

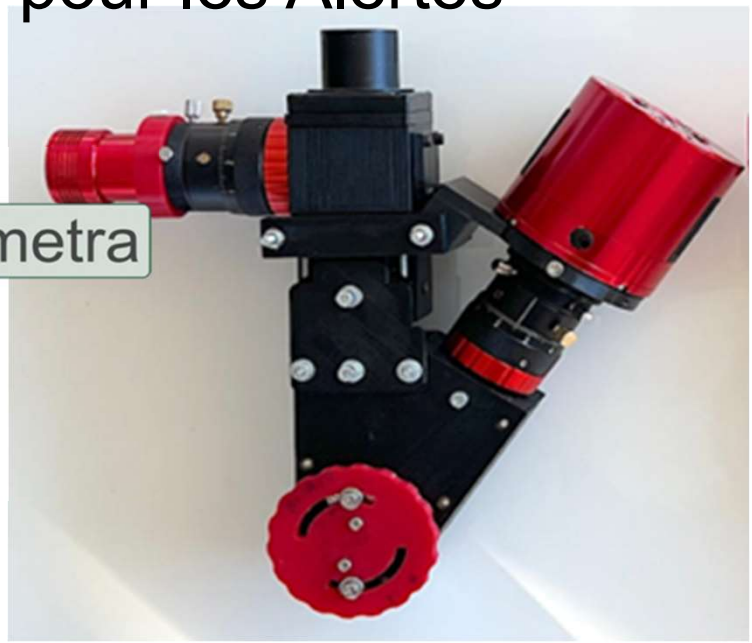
Astro-COLIBRI workshop 17 septembre 2024

thierrymidavaine@sfr.fr

RAPAS : Réseau Amateur Professionnel pour les Alertes Scientifiques

a Pro-Am project





T. Midavaine[1 21], W. Thuillot[2], M. Dennefeld[3], C. Buil[4], S. Neveu[1], M. Serrau[1 5 6], P. Amiot[7], É. Barbotin[8], P. Barroy[6], Rémi Cabanac[7], Y. Delisle[6], J.L. Dumont[9], P. Dupouy[9], T. Dusserre[7], M. Irzyk [6], C. Latgé[11], A. Leroy[6 7 12], J.M. Lopez[13], F. Losse[14], E. Maris[15], J.B. Marquette[1 16], P. Martinez[1 11], P.J. Mercier[9], C. Pantacchini[17], J. Paufique[20], M. Rieutord[7], F. Schüssler[19], J.P. Vignes[22] , J.M. Vienney[6], A. Wünsche[18]

[1] Société astronomique de France
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[3] Institut d'Astrophysique de Paris (IAP)
[4] ARAS AUDE
[5] Dauban Grappa
[6] TJMS Buthiers CPS Planète Sciences
[7] Observatoire du Pic du Midi - AT60
[8] Astroclub Charantais
[9] Société Astronomique de Touraine
[10] Observatoire de Dax
[12] Uranoscope de l'Ile de France
[13] Observatoire des Pises
[14] Observatoire de Saint Pardon de Conques
[15] CEPHEE73
[16] SF2A
[17] Observatoire de Benayes
[18] Observatoire des Baronnies Provençales
[19] CEA
[20] ESO
[21] Club Eclipse
[22] Deep Sky Chile

Scientific Council of Paris Observatory : API (Action Pluri-annuelle Incitative ProAm)

The Scientific Council of Paris Observatory launched a call for proposal for three years : AIP (Action Incitative ProAm) 2022 – 2023 – 2024

- RAPAS project is an API selection in 2022, 2023 and 2024
- 2022 funding the first step :
  - the manufacturing of a first batch of 25 filters sets
  - Kick off workshop and foundation of the RAPAS network 8-9 octobre 2022
- 2023 funding the second step :
  - realisation of 2 spectrograph prototypes meeting low dispersion and high limiting mag to record SED
  - Workshop 2, photometric test feedbacks, spectro design, toward 2024 (25-26 nov 2023)
- 2024 funding a third step
  - Astro-COLIBRI alerts filtering for the RAPAS network capabilities
  - 2nd batch of RAPAS 30 filters with the support of a donation including orders from Pro Observatories
  - Workshop 3 scheduled on the 14th and 15th of december 2024 at Paris Observatory
- The French RAPAS network on the way to answer to alerts
- On the way to an international network ?

A new ProAm collaboration :

Le Réseau Amateurs Professionnels pour les Alertes Scientifiques (RAPAS)

Amateurs-Professionnals Network for Scientific Alerts

RAPAS project is aiming to build an amateur network to answer to a selected list of alerts

- We are inviting amateurs to register in this network with preliminary data related to their observatory facility on the Gemini portal.
- https://proam-gemini.fr/rapas/
- Get access to tutorials and data **http://rapas.imcce.fr/**

- More than 50 registered telescopes 25 equiped with filters, 25 additional telescopes will be equiped end of 2024
- 2025 : x telescopes able to deliver alert SED (Spectral Energy Distribution)

- We deliver to observers a set of 3 ABC filters to unify the photometric data in using Gaia catalog with G, Gbp and Grp photometric system.
- We designed 2 new high sensitivity - low resolution spectrographs
- Then the purpose is to assess the photometric accuracy of the network along 2023 and 2024 and start to react to Astro-COLIBRI selected alerts
- In 2025 connect the network to alert programs and released data

Needs

Set up of an amateur network interested by science alerts by using: astrometry, photometry or spectroscopy

The angular designation accuracy often requires a large FOV and deep magnitude search mode with limited exposure. The amateur telescope Figure Of Merit in a search mode could be :

telescope FOM = f(upper lim mag) . FOV square degree / exposure mn

Amateurs with their respective observatory spread over wide longitude and latitude ranges and behind independant cloud coverage conditions provide optical search mode to deliver RA Dec localisation of optical candidates with a classification to allow then photometric or even spectrometric monitoring function. The purpose is then pass the confirmed and characterized alerts to fitted large telescope instruments.

The needs could be summarised in :

- An array of instruments spread over large territory
- Wide Field Of View Instruments 1°² and above
- High magnitude detection limit >20 in 1min exposure or assessed upper limit magnitude vs exposure
- Unified methodology and uniform photometric data deliveries and low latency to up load data

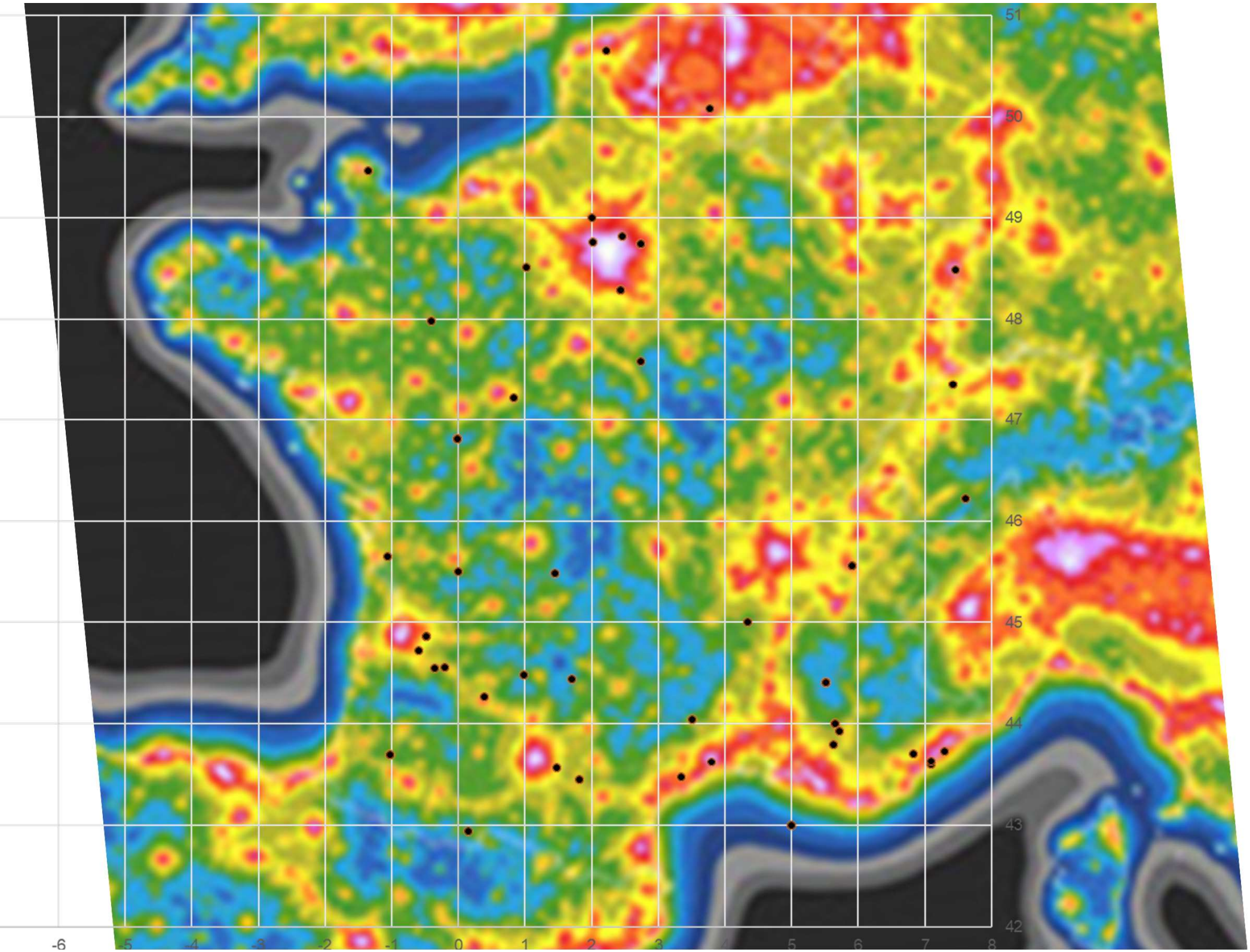
This could provide an amateur network meeting several alerts prgm requirements

RAPAS registerd observers
Mai 2024

63 observers
Attached to 1setup, or
Some on 2 setups
or
Some Instruments
Attached to several observersplusieurs

Located in France
+ 1 Switzerland
+ 6 N&S America

Prénom	Nom	Club, affiliation ou observatoire	Longitude d	Latitude de	codeMP	Diamètre	Surface	Focale in	F/D	Taille cap	Taille cap	champ°2	SurfxChamp		dimension filtre	commentaires	Filtr
Thierry	Midavaine	Observatoire Salvia	-0.4075	47.9825	i73	500	0.1963	1400	2.8	24.0	36	1.447	0.284		2 pouces		1
Pierre	Barroy	Planète Sciences, observatoire JM Salomon	2.4380	48.2918	199	600	0.2827	2100	3.5	15.7	23.5	0.275	0.078		36	TJMS	1
Patrick	Baroni	Eclipse	2.0000	49.0000	non	200	0.0314	1000	5.0	10.0	10	0.328	0.010		40	Décédé 01/12/2022	1
Jean-françois	Coliac	OABAC	5.0000	43.0000		200	0.0314	800	4.0	8.8	15.6	0.705	0.022		31.7	Pas dispo en 2022	0
Yannic	Delisle	CPS TJMS Buthiers	2.4380	48.2918	199		0						0.000		36	TJMS cf ci-dessus	1
Jean-Louis	Dumont	Société Astronomique de Touraine	0.8300	47.2200	non	400	0.1257	1600	4.0	8.9	13.9	0.159	0.020		2"	Dispo en 2024	1
Christian	Pantacchini	Observatoire de BENAYES	1.4500	45.4833	non	250	0.0491	1349	5.4	17.6	25.1	0.799	0.039		néant	Nom obs AAVSO : PCH	1
Anaël	Wünsche	Observatoire des Baronnies Provençales	5.5150	44.4081	B10	820	0.5281	4870	5.9	30.0	30	0.125	0.066		2", 2" = 50mm	Non équipé de filtres	0
Anaël	Wünsche	Observatoire des Baronnies Provençales	5.5150	44.4081		432	0.1466	1970	4.6	24.0	36	0.731	0.107		2"	Equipés des filtres RAP	1
Olivier	Dechambre	Club Eclipse	2.0144	48.7650	non	300	0.0707	1200	4.0	9.2	13.8	0.289	0.020		31.7		0
Matthieu	Conjat	Aquila / Observatoire de la Côte d'Azur	7.2997	43.7250	020	500	0.1963	7500	15.0	22.5	22.5	0.030	0.006		31.75	Autre instrument dispon	1
Arnaud	Leroy	Uranoscope de l'Ile de France	2.7422	48.7422	A07	355	0.099	710	2.0	11.3	11.31	0.833	0.082		2 pouces montée	porte filtres manuel IMX	1
Arnaud	Leroy	Uranoscope de l'Ile de France	2.7422	48.7422		250	0.0491	1250	5.0	11.3	11.31	0.269	0.013				1
Patrick	Martinez	SAF - ADAGIO - Observatoire de Bélesta	1.8163	43.4442	A05	820	0.5281	3110	3.8	24.0	36	0.293	0.155		50		1
Gerald	Mauboussin	Observatoire de la Billette	1.0223	48.5100	non	200	0.0314	2000	10.0	13.0	13	0.139	0.004		50.8		0
Jean Marie	Lopez	SAM- Observatoire des Pises	3.5035	44.0395	122	500	0.1963	2200	4.4	24.0	36	0.586	0.115		50mm	Capteur CCD Kaf 6303	1
Patrick	Wullaert	SAF, Astro-Club d'Ouzouer sur Loire	2.7401	47.5880	non	200	0.0314	1000	5.0	7.0	11.25	0.259	0.008		31.75	Mon club possède un D	1
Observatoire Frar	Bagnoud	Observatoire François-Xavier BAGNOUD	7.6130	46.2270	175	300	0.0707	1500	5.0	13.4	17.7	0.346	0.024		31	Pas dispo 2023-Nous al	0
Jean-Baptiste	Marquette	LAB	0.3911	44.2616	non	250	0.0491	1000	4.0	8.8	13.19	0.381	0.019		31.75	Pas dispo 2022-Il manq	1
Marc	Serrau	SAF & Planète-Sciences	5.6475	43.9997	A77	300	0.0707	3270	10.9	13.5	17.96	0.074	0.005		36	Taille capteur = diagona	1
Hadrien	Dupuis	Observatoire Jocelyn Bell de Toulouse / UPS	1.4685	43.5632		508	0.2027	2279	4.5	37.0	37	0.865	0.175		50x50mm	3454mm (ou 2279mm a	1
Guy	Copin	GAP 47	0.9833	44.4833	Non	250	0.0491	1250	5.0	23.2	23.2	1.131	0.056		2"	Très interressé par les f	1
Fabian	Schussler	Astro-COLIBRI															0
Philippe	Dupouy	Observatoire de Dax	-1.0300	43.6933	958	200	0.0314	1410	7.1	6.3	8.8	0.092	0.003		31 mm ASI1600	Possibilité d'équiper ces	1
Philippe	Dupouy	Observatoire de Dax	-1.0300	43.6933		500	0.1963	2250	4.5	13.4	17.7	0.154	0.030		ASI1600	Equipé des filtres	1
Florent	Losse	St Pardon de Conques (observatoire indéper	-0.2031	44.5588	l93	408	0.1307	1500	3.7	15.7	23.5	0.538	0.070		36mm non monté	Très actif sur les confirm	1
Jonathan	Kobs	OVNI Night Vision	-1.0622	45.6500		200	0.0314	1200	6.0	7.9	11.8	0.213	0.007		50,8mm	J'utiliserai un oculaire in	0
Jérôme	Paufique	ESO															1
Philippe	Morel	Observatoire Charles Fehrenbach	3.7761	50.0848		355	0.099	3910	11.0	24.0	36	0.186	0.018		2"		1
Paulo	Cacella	Dogsheaven Observatory	-47.9111	-15.8917	X87	508	0.2027	2230	4.4	31.0	31	0.634	0.129		31	Other 5 telescopes, LHI	0
Marc	Serrau	Planète-Sciences	5.6475	44.0000	B24 et /	275	0.0594	3000	10.9	16.0	23.9	0.139	0.008		36		0
Jean-Marie	Vugnon	club eclipse	-0.0177	46.8111		260	0.0531	1220	4.7	24.0	36	1.905	0.101		50mm, 31.75mm		0
Jean-Marie	Vugnon	club eclipse	-0.0177	46.8111		200	0.0314	1000	5.0							Audine 1600	1
Serge	Vasseur	SAF, GAAC	2.2206	50.6525	Non	406	0.1295	1800	4.4	7.0	11.25	0.080	0.010		50.8		0
Patrick	Sogorb	Club Luberon Sud Astro, Bastidan observato	5.6281	43.7908	D11	280	0.0616	1530	5.5	16.0	16	0.359	0.022		31.75	équipé de filtres mais te	1
Roger	Hellot	Observatoire Rosheim-TRBL	7.4594	48.4900	Non	279	0.0611	2790	10.0	9.0	12	0.046	0.003		31.75	équipé des filtres	1
Emmanuel	Thiers	Astronomade	1.7063	44.4394		280	0.0616	1860	6.6	3.8	3.8	0.014	0.001		36mm	non équipé des filtres	0
Lisa	Maris	CEPHEE73	5.9106	45.5614	No	200	0.0314	2000	10.0	16.1	16.67	0.220	0.007		1.25"	(avec réducteur de focal	0
Lisa	Maris	CEPHEE73	5.9106	45.5614	No	280	0.0616	1764	6.3	15.2	15.3	0.245	0.015			équipé des filtres	1
Éric	Barbotin	Astroclub charentais	0.0000	45.5000	Non	500	0.1963	3400	6.8	24.0	36	0.245	0.048		50	équipé des filtres mais t	1
jean-luc	Martin	GAPRA Antibes	6.8333	43.7000	non	250	0.0491	2000	8.0	12.7	19.05	0.199	0.010		36 mm	comment peut on se pro	0
Gérard	Arlic	Bommes Observatory	-0.3572	44.5497	non	200	0.0314	1000	5.0	13.5	17.6	0.781	0.025		50	T 400 sous coupole en	1
Christian	Buil	AUDE	7.0872	43.5922	Non	250	0.0491	1250	5.0	24.0	36	1.815	0.089		NA		0
Jean-Christophe	Dalouzy	Observatoire de Rouen	-1.3480	49.4680		350	0.0962	1400	4.0	10.0	12.5	0.209	0.020		31.75		0
Guillaume	Biesse	SAF				200	0.0314	1600	8.0	15.2	15.3	0.298	0.009		31.75	Une Moravian G2-4000	0
Etienne	Joseph-Reinette	ASTRAMAZONIE	-52.3053	4.9355		130	0.0133	1000	7.7						31.75		0
Michel	Rieutord	Observatoire Midi-Pyrénées	0.1450	42.9369		508	0.2027	2299	4.5	24.0	36	0.537	0.109		50.8	C'est le T50 du Pic-d-Mi	1
Fred	Denjean	Astronomie Gironde 33 AG33	-0.4845	44.8592	Non	200	0.0314	2000	10.0	13.0	19.1	0.204	0.006		1'1/4 et 2'		0
Yoann	Degot Longhi	Observatoire de Haute Provence	5.7122	43.9289	511	600	0.2827	2000	3.3	24.0	36	0.709	0.200		50mm		0
Fred	Denjean	Astronomie Gironde 33 (AG33)	-0.4845	44.8592	non	200	0.0314	2000	10.0	4.6	4.6	0.017	0.001		1,25 et 2"		0
Damien	Lachat	SJA- Observatoire astronomique jurassien	7.4206	47.3518	185	610	0.2922	1963	3.2	13.1	19.2	0.214	0.063		50.8	ASI294MMPRO	0
Thierry	Garrel	Observatoire de Fontcaude	3.8000	43.6200		350	0.0962	1300	3.7	13.5	18.0	0.471	0.045		28	ZWO 2600	0
jean-Sébastien	Devaux	OAV	3.3425	43.4706	non	350	0.0962	1600	4.6	8.9	13.2	0.151	0.014		31.76		0
stephane	Ubaud	UVEX4 team	7.0962	43.6265		280	0.0616	2800	10.0	13.5	18.0	0.102	0.006		50		0
Serge	Bergeron	AAVSO	-75.0914	45.3058	G30	305	0.0731	1755	5.8	10.0	15.0	0.160	0.012		31,76	I have a second system	0
jean-pascal	Vignes	Exoclock collaboration	-70.8500	-30.5200		432	0.1466	1959	4.5	24.0	36.0	0.739	0.108		50		0
Jean-Francois	Gout	Tree Gate Farm Observatory	-88.7328	33.3476		280	0.0616	540	1.9	16.0	16.0	2.882	0.177		50.8		0
Jean-Pascal	Vignes	Deep Sky Chile	-70.8500	-30.5200	non	400	0.1257	1945	4.9	24.0	36.0	0.750	0.094		50		0
CAM	Club d'Astronor	CAM, Observatoire Hubert Reeves	4.3350	45.0070		600	0.2827	5200	8.7	25.0	26.0	0.079	0.022		50		0
Denis	St-Gelais	Sociedad Astronomica Queretana	-100.3078	20.6009	V54	356	0.0995	1538	4.3	18.4	27.5	0.702	0.070		50.4	Je suis bien content d'êt	0
Jean-Christophe	Dalouzy	SADR	-70.7964	-30.5339	X03	350	0.0962	1750	5.0	23.5	23.5	0.592	0.057		50		0
Thomas	Salomon	Astronomie Gironde 33	-0.5900	44.7200		355	0.099	2840	8.0	24.0	36.0	0.352	0.035		50.8		0
Jean-Paul	Godard	Uranoscope, K07	2.4615	48.8178	K07	200	0.0314	2000	10.0	24.0	36.0	0.709	0.022		50.8	K07 ne se visite pas.	0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RAPAS registered telescope features

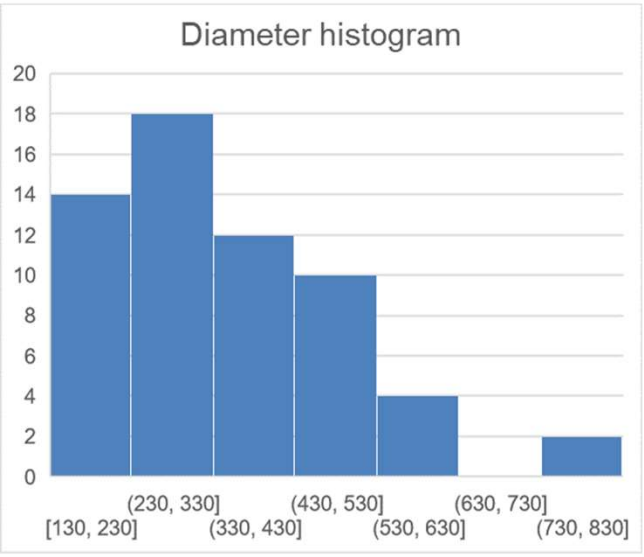
- Diameter
- Field of View (FoV)
- Geometric étendues (Pupil Area x FoV)

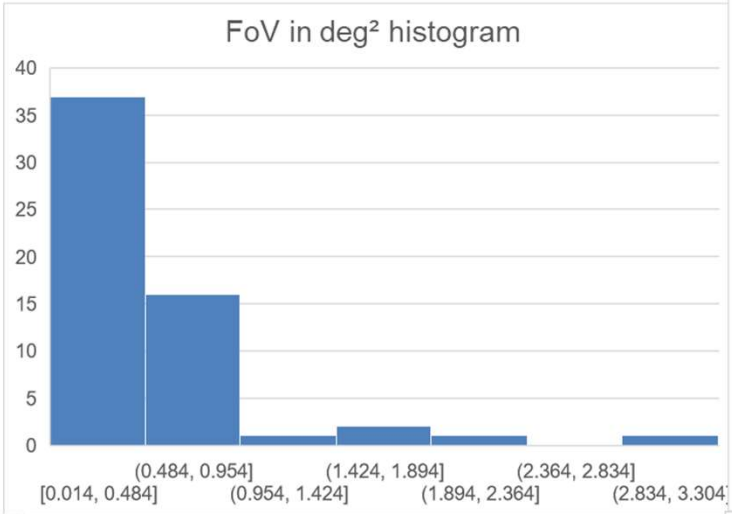
Pupil Area

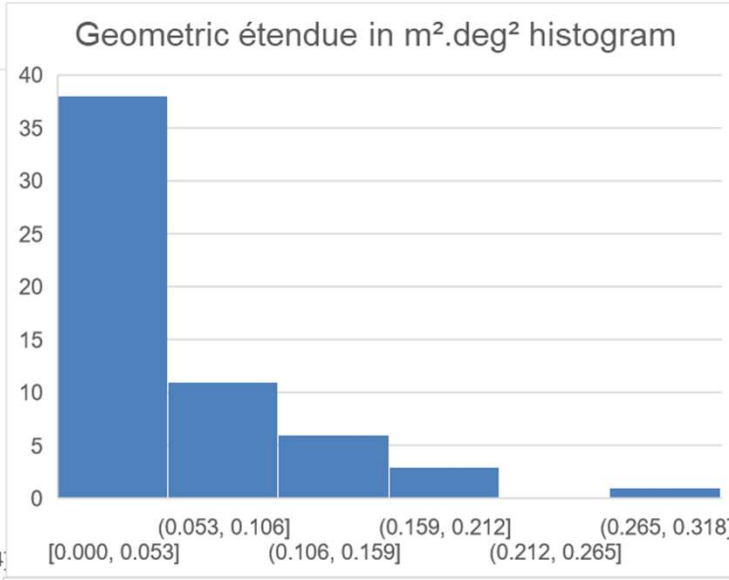
Focal length

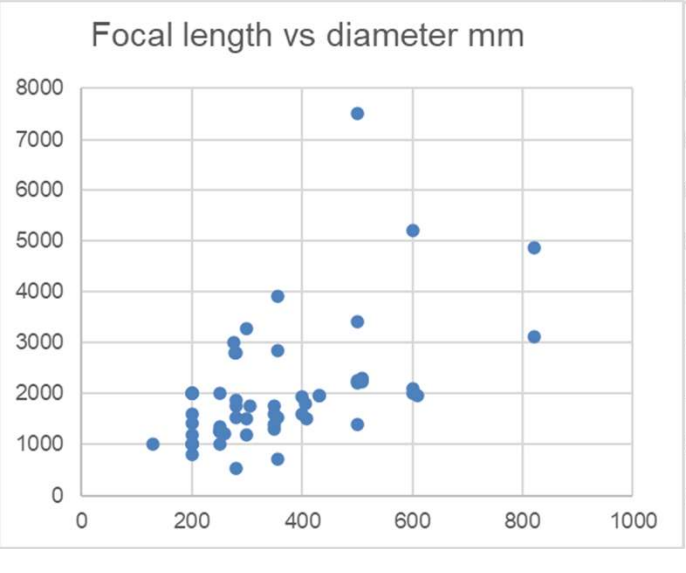
F/D f number

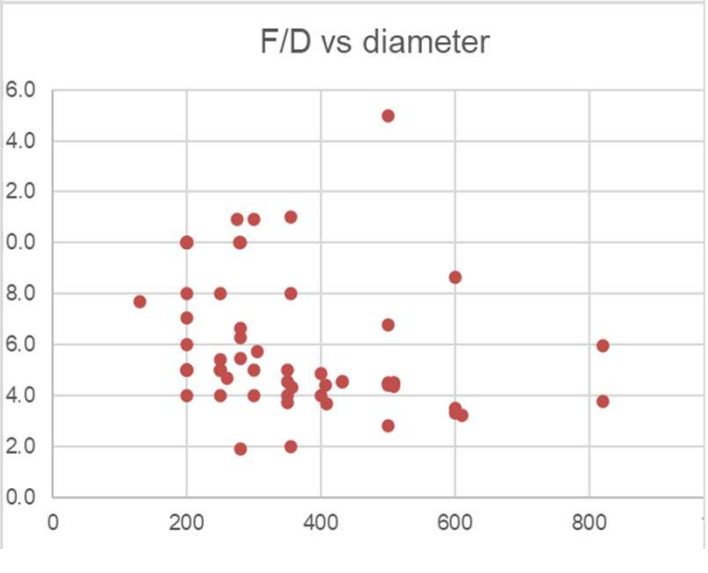
focal plane array area

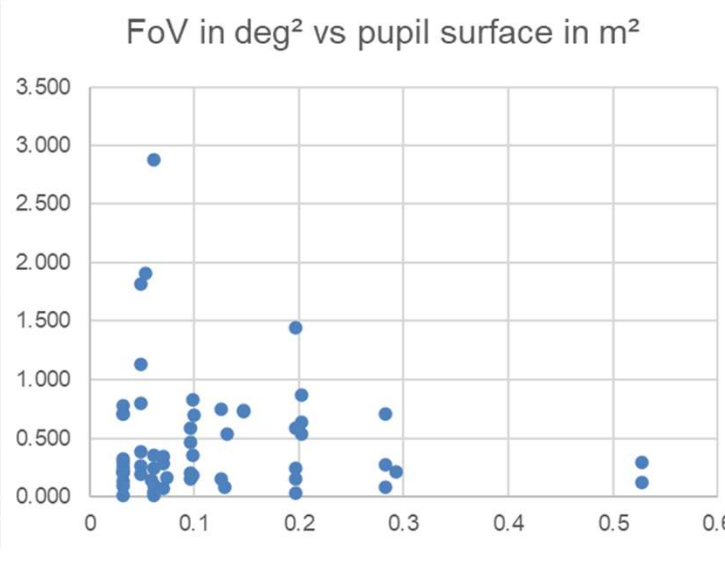




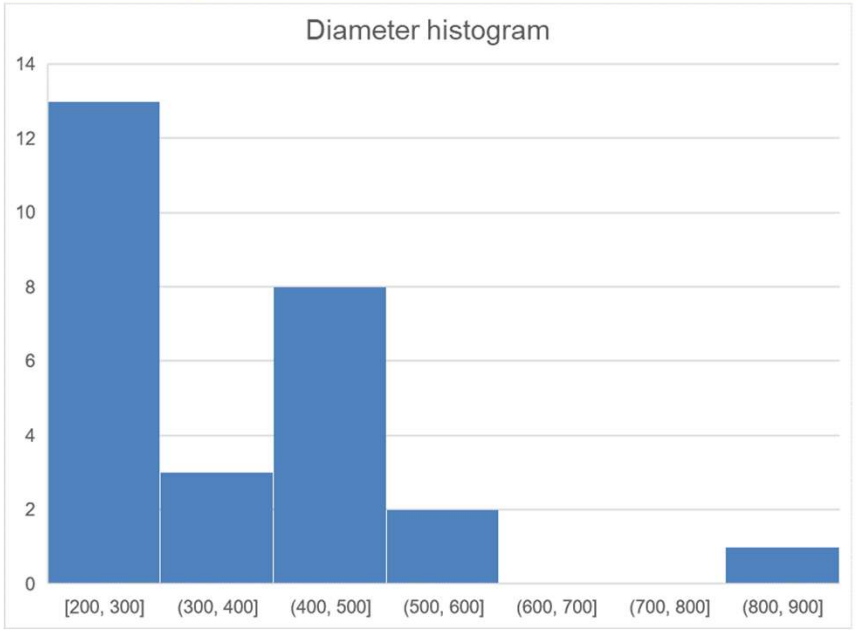


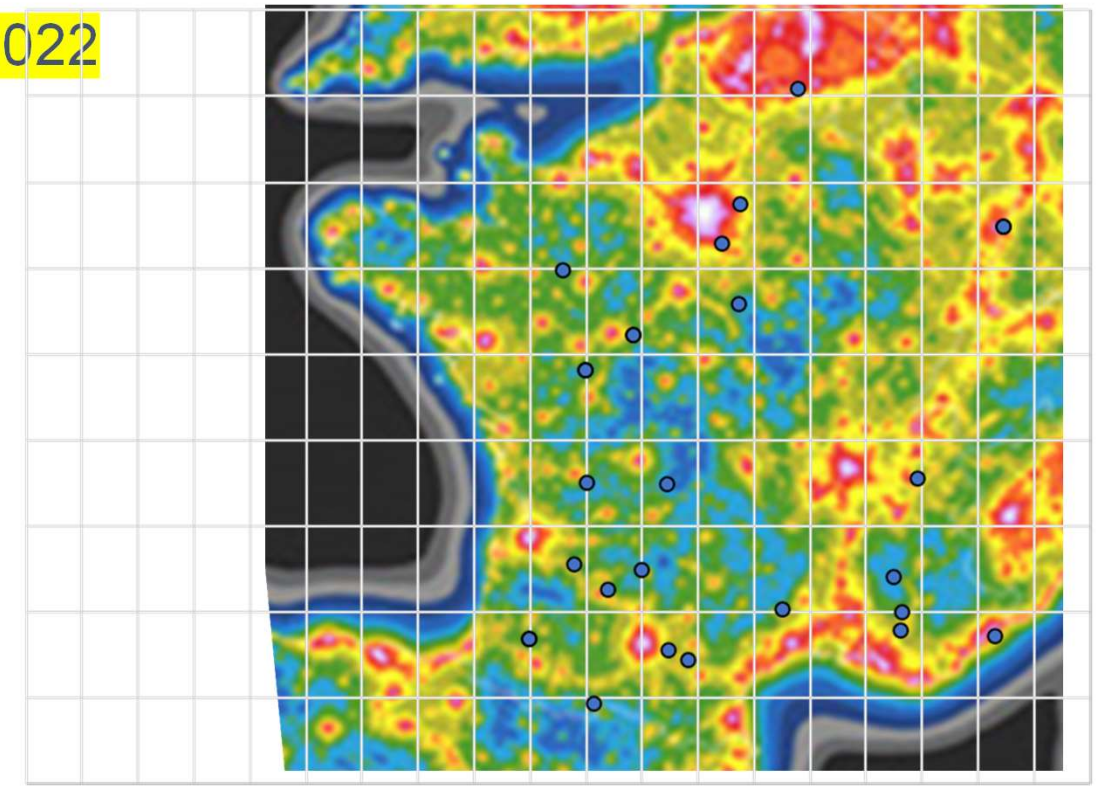






The delivery of first filter batch : end 2022





Prénom	Nom	e-mail	Club, affiliation ou observatoir	Longitud	Latitude	Dis	Diam	Surf	Foca	f/D	Camera_	Capteur	taill	taille	pixel µ	Champ °	F Gui	D filtr	Logiciels	Comment	N° c	Date de M	SA51 ex
Patrick	Martinez	patrick.martinez264@or	SAF - ADAGIO - Observatoire d	1.8163	43.4442	A05	820	0.528	3110	3.8	Moravian C	CMOS	24	36	3.76	0.2932454		50			12	11/11/2022	
Yannic	Delisle	delislehatte@yahoo.fr	CPS TJMS Buthiers	2.4380	48.2918	199	600		2100	3.5	QHY268MM	IMX571	15.7	23.5	3.76	0.2746424		50	PrismV11		5	09/10/2022	
Michel	Rieutord	michel.rieutord@irap.on	Observatoire Midi-Pyrénées	0.1450	42.9369		508		2299	4.5		C'est le T50	24	36	3.76	0.5366217		50			19	26/06/2023	
Thierry	Midavaine	thierrymidavaine@sfr.fr	Observatoire Salvia	-0.4075	47.9825	i73	500		1400	2.8	ASI6200MM	IMX455	24	36	3.76	1.4469995	0	50	PrismV11	vignettage su	1	31/10/2022	600
Jean-Marie	Lopez	skyciel34@gmail.com	SAM- Observatoire des Pises	3.5036	44.0392	122	500		2200	4.4	ASI6200MM	IMX455	24	36	3.76	0.5860027		50	PrismV11		14	13/11/2022	
Philippe	Dupouy	obsdax@orange.fr	Observatoire de Dax	-1.0300	43.6933		500		2250	4.5			13.4	17.7		0.1537994		36			22		60
Hadrien	Dupuis	observatoire-jbt@upsins	Observatoire Jocelyn Bell de Tou	1.4685	43.5632		500		2279	4.6			37	37		0.8652488		50			6	12/11/2022	mars-24
Éric	Barbotin	ebarbotin@sfr.fr	Astroclub charentais	0.0000	45.5000		500		3400	6.8			24	36		0.2453552		50			16	01/05/2023	revision mor
Matthieu	Conjat	mconjat@free.fr	Aquila / Observatoire de la Côte	7.2997	43.7250	020	500		7500	15.0			0	22.5		0.0295452		31.75		Autre instrum	10	12/11/2022	nov-23
Anaël	Wünsche	anael.wunsche@obs-bp	Observatoire des Baronnies Prov	5.5000	44.4000	B10	430		1970	4.6			24	36		0.7308178		50			8	11/11/2022	120
Florent	Losse	florent_losse@yahoo.fr	St Pardon de Conques (observat	-0.2031	44.5588	I93	408		1500	3.7	ASI2600MM	IMX	15.7	23.5	3.76	0.5382914		36		Très actif sur	23	13/11/2022	60
Jean-Louis	Dumont	jld37@sfr.fr	Société Astronomique de Tourai	0.8300	47.2200		400		1600	4.0	ZWO 183MM		8	13.9		0.1586376					13	13/02/2024	
Arnaud	Leroy	uranoscopeidf@gmail.c	Uranoscope de l'Ile de France	2.7422	48.7422	A07	355		710	2.0			11.31	11.31	3.76	0.8329816		50		porte filtes ma	11	11/11/2022	
Philippe	Morel	Morel.Philippe@wanadc	Observatoire Charles Fehrenbac	3.7761	50.0848		355		3910	11.0			24	36		0.1855244		50.8			2	13/11/2022	Vega
Marc	Serrau	marc.serrau2@free.fr	SAF & Planète-Sciences	5.6475	43.9997	B24 et	300		3270	10.9	QHY268M	IMX571	15.7	23.5	3.76	0.0744369		36			18	13/11/2022	600
Patrick	Sogorb	patrick.sogorb@gmail.c	Club Luberon Sud Astro, Bastida	5.6281	43.7908	D11	280		1530	5.5				16		0.359		31.75			17		retour des fi
Lisa	Maris	elisabeth.maris.froelich@gmail.com		5.9106	45.5614		280		1764	6.3	ATIK4000	KAI 04022	16.05	16.67	7.4	0.2453453					25		1200
Roger	Hellot	roger.hellot@gmail.fr	Observatoire Rosheim-TRBL	7.4594	48.4900		279		2790	10.0			9	12		0.045547		31.75			4		nov-23
Jean-Marie	Vugnon	jm-v@sfr.fr	club eclipse	-0.0177	46.8111		260		1220	4.7			24	36				50			21	13/11/2022	
Jean-Baptist	Marquette	jean-baptiste.marquette	LAB	0.3911	44.2616		250		1000	4.0			8.81	13.19		0.3814669		31.75		pb de halot ou	24	01/12/2023	déc-23
Guy	Copin	guycopin@orange.fr	GAP 47	0.9833	44.4833		250		1250	5.0				23.2		1.1307752		50		Très interress	20	Poste	
Arnaud	Leroy	uranoscopeidf@gmail.c	Uranoscope de l'Ile de France	0.8300	47.2200		250		1250	5.0	PlayerOne	IMX533	11.31	11.31	3.76	0.2687476					11		720
Christian	Pantacchini	christ.panta@gmail.com	Observatoire de BENAYES	1.4500	45.4833		250		1358	5.4			17.64	25.1		0.7986839		néant		Nom obs AA	7	13/11/2022	
Patrick	Wullaert	wullaert_chatillon@hotm	SAF, Astro-Club d'Ouzouer sur l	2.7401	47.5880		200		1000	5.0			7	11.25		0.2585172		31.75		Mon club pos	15	11/11/2022	
Jean-Marie	Vugnon	jm-v@sfr.fr	club eclipse	-0.0177	46.8111		200		1000	5.0											21		
Philippe	Dupouy	obsdax@orange.fr	Observatoire de Dax	-1.0300	43.6933	958	200		1410	7.1			6.3	8.8		0.0915436		31		Possibilité d'é	22	13/11/2022	1
Lisa	Maris	elisabeth.maris.froelich(	CEPHEE73	7.4594	48.4900		200		2000	10.0			15.2	15.3		#REF!		31.75			25	13/11/2022	

Where can we find the Gaia filters ?

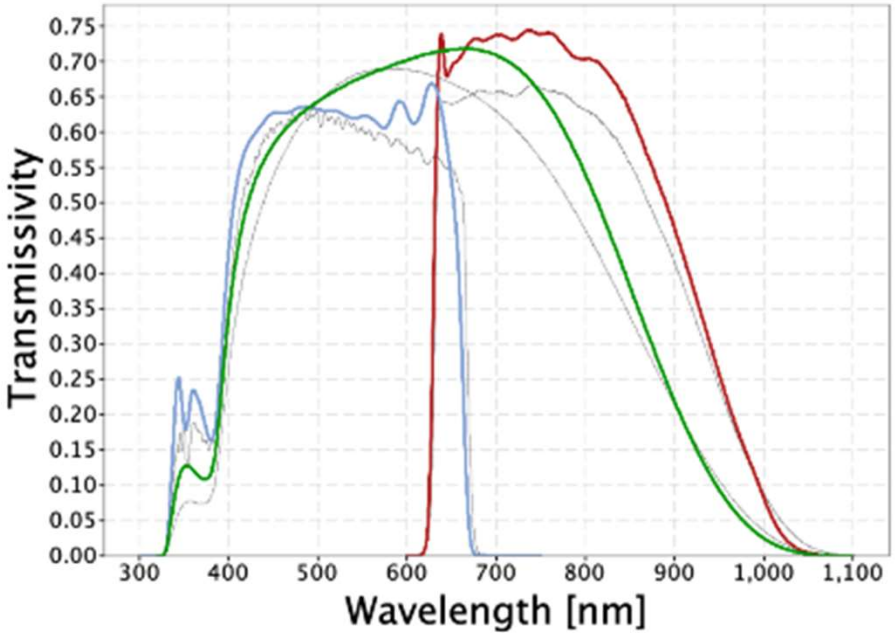
Gaia mission delivers alerts :

- https://gaiafunsso.imcce.fr/
- http://gsaweb.ast.cam.ac.uk/alerts/home

Gaia mission delivers des catalogues astrometric and photometrics catalogues 1,8 Giga objects up mag 20.7 in 3 bands G, 1,5 Giga objects in G_{BP} and G_{RP} outside the Earth atmosphere.

- Gaia DR1 20216
- Gaia DR2 (Grappa extract) 2018
- Gaia EDR3 (Grappa extract) 2020
- Gaia DR3 June 2022
- Gaia DR4 will be released end of 2025
- Gaia DR5 is scheduled in 2028
- …

The three Gaia optical filters are not available :

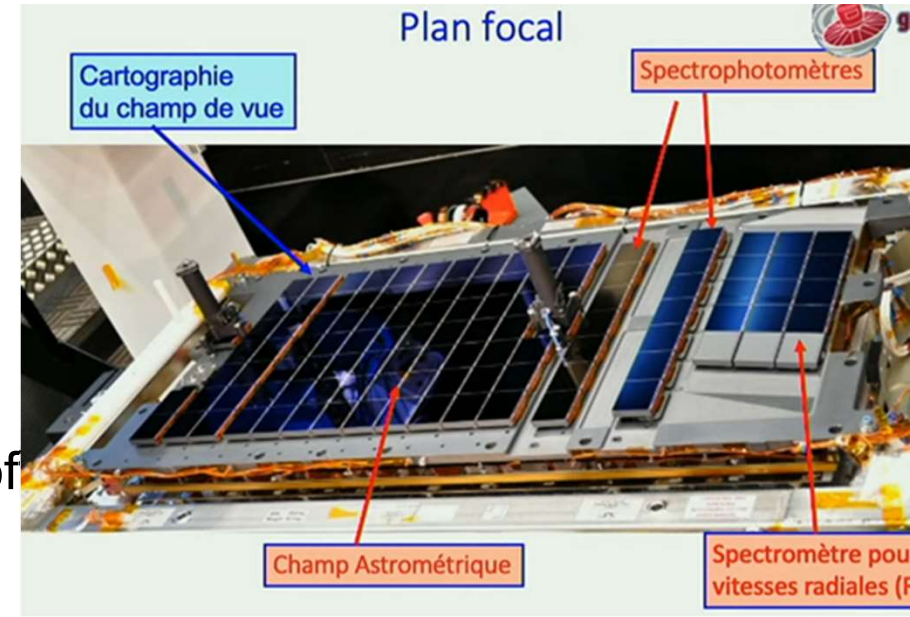


(Crédits ESA/Gaia/DPAC, P.Montegriffo, F. de Angeli, C. Cacciari)

The 3 Gaia wide bands bring an enhanced SNR an magnitude upper limit for amateur telescopes. It allows direct photometric reduction with the G, Gbp and Grp Gaia catalog. Several Amateur softwares are used in the network :

- Prism V11 with Grappa (EDR3) Marc Serrau
- Muniwin
- AstroImage J et Gaia EDR3 via Vizier
- Siril
- Astropy suite

Gaia DR3 catalog accy



Photometry : G, G_{BP}, and G_{RP} published as part of Gaia EDR3, (other data are new in Gaia DR3)

The G band is defined by the quantum efficiency of the CCD used for astrometry
The G_{BP} and G_{RP} bands are defined by the prism spectrum and pixel bining of dedicated CCD for the 2 Gaia sub bands.

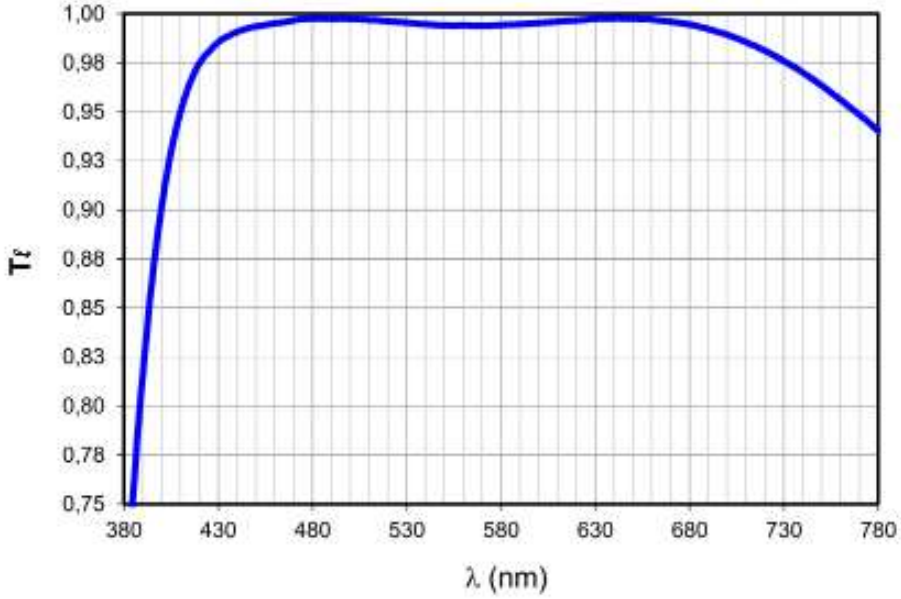
- The G-band photometric uncertainties are ~0.3 mmag for G<13, 1 mmag at G=17, and 6 mmag at G=20 mag.
- The GBP-band photometric uncertainties are ~0.9 mmag for G<13, 12 mmag at G=17, and 108 mmag at G=20 mag.
- The GRP-band photometric uncertainties are ~0.6 mmag for G<13, 6 mmag at G=17, and 52 mmag at G=20 mag.
- More information on the properties and limitations of the BP/RP spectra will be published closer to the release of Gaia DR3.

The three RAPAS filters : A, B, C

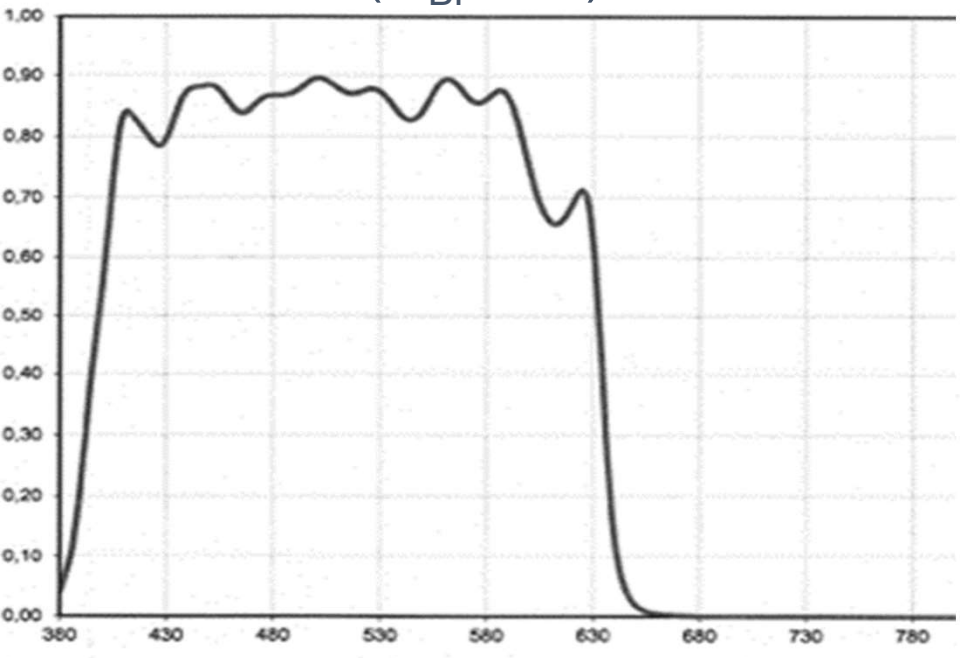
Pictures of the three filters A, B, C set : in 2022 a first batch of 25 fi… was released

- Packing
- Normal transmission
- Aspect angle transmission
- Reflexion

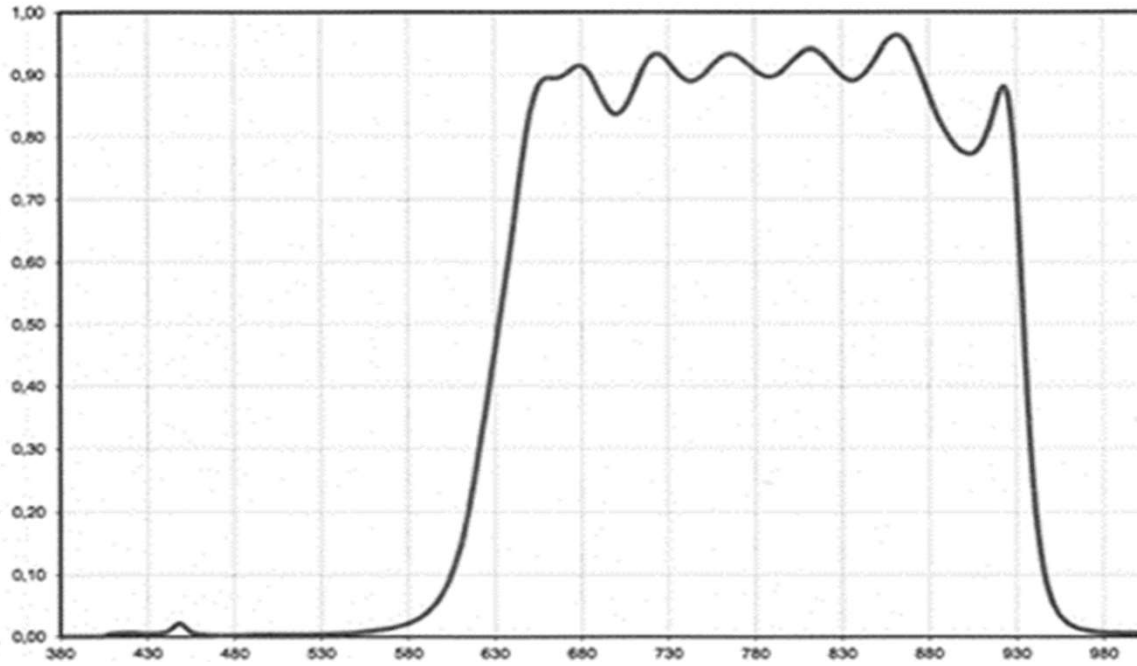
A filter (G like)



B Filter (G_{BP} like)



C filter (G_{RP} like)



Selected areas to assess magnitude upper limit

Edgar Everhart Sky&Telescope Jan 1984

Finding Your Telescope's Magnitude Limit

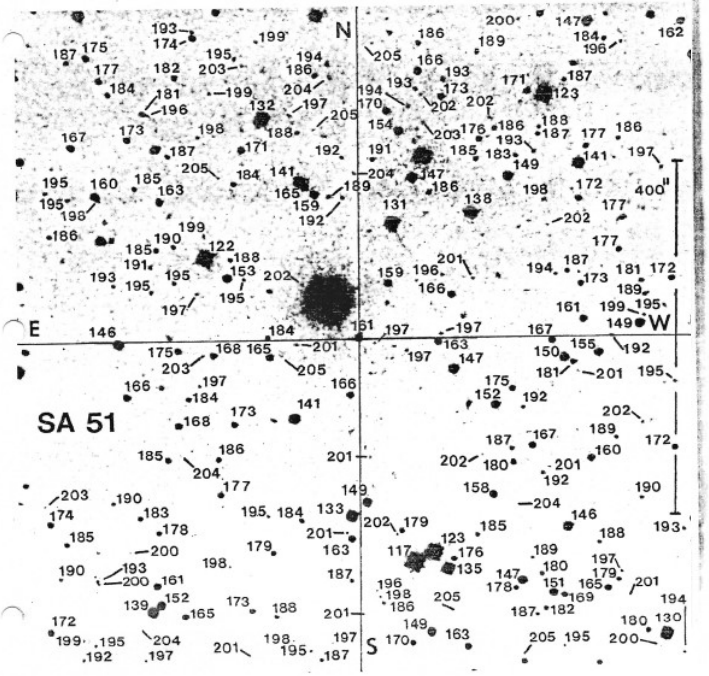
EDGAR EVERHART, *Chamberlin Observatory, University of Denver*

HOW FAINT will it reach? This is a question that often comes to mind when considering a telescope or camera to be turned toward the heavens. While there are numerous tables that cite the limiting stellar magnitude for a given telescope aperture (see, for example, page 193 of the March, 1980, issue), in practice this limit is affected by many factors.

The condition and number of optical surfaces in a system will affect performance, as will light pollution and other atmospheric effects. For the observer, the physical condition of the eye is important, while photographers must consider such factors as film, filters, exposure times, and developing methods.

Therefore, in order to determine the limiting magnitude of a particular instrument, it is best to observe or photograph the sky directly. This calls for some type of star atlas or chart showing the magnitudes of selected stars. But herein lies a problem: Even binoculars and short exposures with small cameras will reveal stars fainter than those plotted in Wil Tirion's *Sky Atlas 2000.0* (limiting magnitude 8.0) or *The AAVSO Variable Star Atlas* (limit about 9.0).

For fainter magnitudes there are the Vehrenberg *Atlas of the Selected Areas* and charts for certain variable stars prepared by the American Association of Var-



Star Observers. Both include stars to about 16th magnitude — adequate for visual observers working with instruments up to nearly 30-inch aperture. But photographers can reach even fainter stars with surprisingly modest equipment.

Sixty years ago, the famous 16-inch (0.4-meter) Metcalf camera at Harvard Observatory was recording stars to magnitude 16. Today, however, advances in emulsions and hypersensitizing techniques make it possible for the same size telescope to photograph stars of 21st magnitude. Smaller telescopes can easily reach beyond the 16th-magnitude limit of the charts mentioned above.

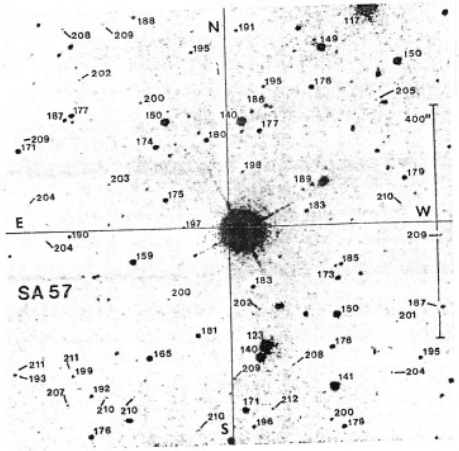
Large observatories have special methods for calibrating photographic plates and determining the magnitudes of faint stars on them. The photographs described and reproduced here will be useful for smaller servatories and advanced amateurs, as y contain accurate star brightnesses down to 21st magnitude.

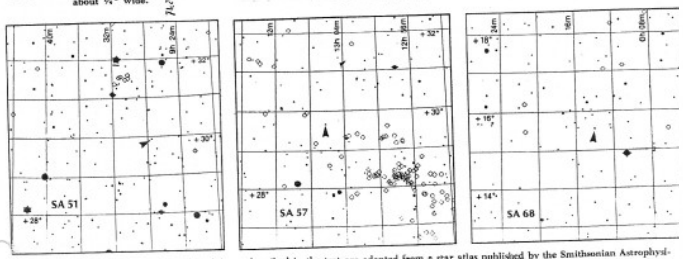
The magnitudes marked on the photographs are from a paper by L.-T. G. Chiu published in the *Astrophysical Journal Supplement* for September, 1980. Chiu was studying the structure of our galaxy as determined by proper motions of stars. For this work he used numerous photographs made in blue, yellow, and red light with the giant reflectors at Lick, Kitt Peak, and Palomar observatories. Chiu credits I. R. King and co-workers at the University of California, Berkeley, for the photovisual magnitudes of the stars. They used an iris photometer calibrated with photoelectric sequences. Photovisual magnitudes do not correspond exactly with what the eye sees but are reasonably close.

Chiu studied stars in Selected Areas (SA) 51, 57, and 68, each nearly centered on an 8th- or 9th-magnitude star listed in the Smithsonian Astrophysical Observatory *Star Catalog*. These areas are fairly well distributed in right ascension, and at least one field is accessible on most nights in the Northern Hemisphere.

Although the magnitudes listed in Chiu's tables are quite accurate, he did not include charts. I remedied this by photographing all three areas with the 16-inch f/5.5 astrographic reflector at Chamberlin Observatory's Dick Mountain Field Station near Bailey, Colorado. The exposures, made between December, 1980, and July, 1981, were 75 to 100 minutes in duration on nights of good seeing. I used Kodak's Technical Pan Film 2415, which was hypersensitized before exposure by soaking in forming gas (8 percent hydro-

The photographic charts with this article were prepared by the author and are more fully described in the text. Each is nearly centered on a bright star listed in the table on page 30, while finder charts for the fields are below. Photovisual magnitudes are shown for selected stars with decimal points omitted (for example, 184 indicates a star of magnitude 18.4). All photographs have north up, and each field is about ½° wide.





These finder charts for the three Selected Areas described in the text are adapted from a star atlas published by the Smithsonian Astrophysical Observatory. North is up, and each field is 5° square. Arrows denote the bright star near the center of each of the author's photographs. The finder chart for SA 51 contains Gemini's bright stars Castor at top center and Pollux at lower left. The brightest star in the SA 57 finder is 4th-magnitude Beta Comae Berenices at lower left. SA 68 is located just northeast of 3rd-magnitude Gamma Pegasi.

PRIMARY STAR IN EACH SELECTED AREA

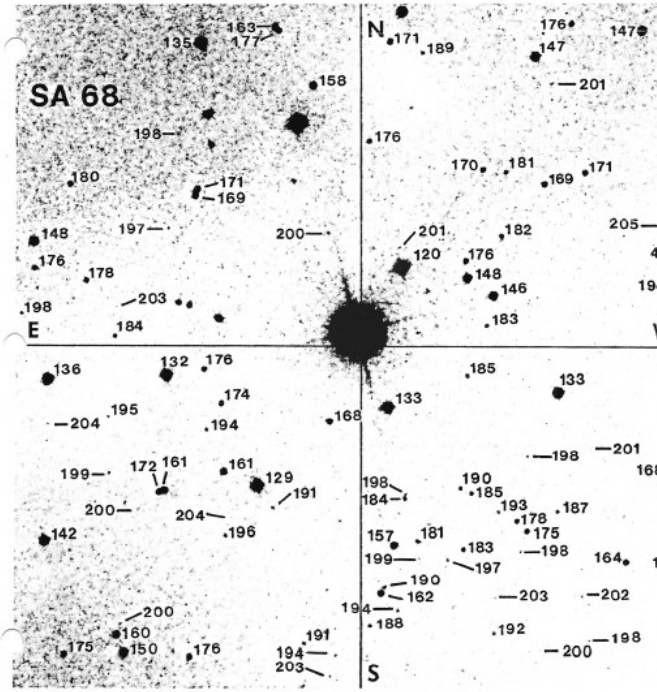
Area	*Star*	*Mag.*	*1950.0*	*2000.0*
SA 51	SAO 79445	9.1	7h 27.5m, +29° 56′	7h 30.6m, +29° 50′
SA 57	SAO 82672	8.1	13h 6.3m, +29° 39′	13h 8.6m, +29° 23′
SA 68	SAO 91810	8.2	0h 14.0m, +15° 34′	0h 16.6m, +15° 50′

gen, 92 percent nitrogen) at atmospheric pressure for five hours at 60° C. The 4 x 5 film sheets were processed in D-19 developer for five minutes at 21° C.

My negatives were enlarged 24 times and made into reverse prints (black stars on a white background). The exact scale as reproduced here can be found from the line 400 arc seconds long on the right side of each print.

Within the borders of the photograph of SA 51, Chiu's list contains 235 stars to photovisual magnitude 20.5. Of these, seven stars are covered by the image of a brighter one. Six of magnitude 20.5 are shown on the photograph, but another of the same brightness is not.

For the photograph of SA 57, Chiu's list contains 65 stars. Of these, two were covered by other images and three were not found. Among the 60 stars marked are five with magnitudes from 21.0 to 21.2



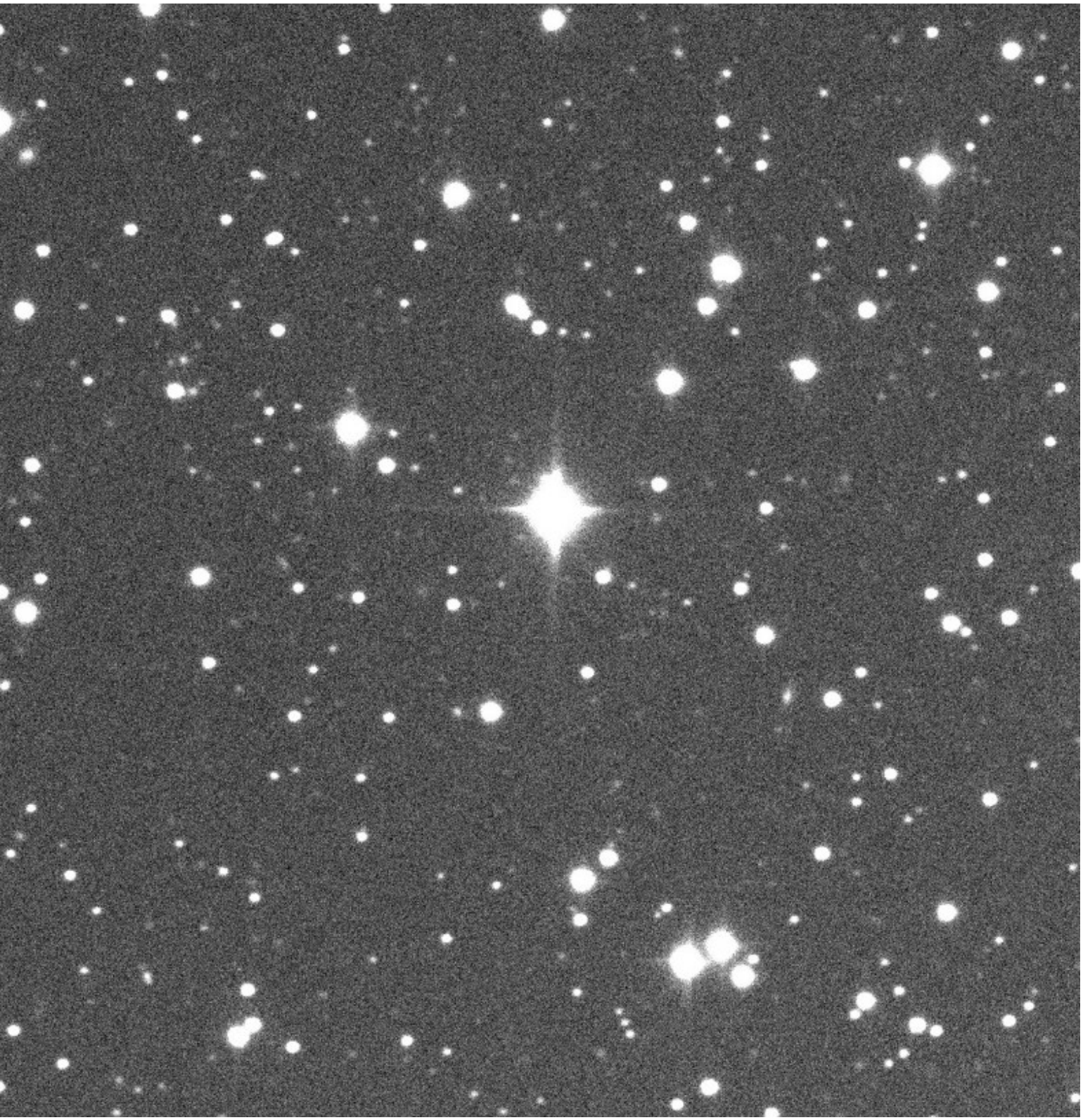
(the basis for my earlier stateme
day a 16-inch telescope can r
magnitude stars). The photogr
68 should contain 89 stars from
but one was not found. The rem
some as faint as magnitude 20
visible.

I wish to thank Elizabeth Roe
University of Arizona for calling
tion to Chiu's original paper, a
Hoag at Lowell Observatory for
and suggestions while I was wo
on this project.

*Edgar Everhart is the director o
lin Observatory at the University
where he teaches physics and astron
currently active in astrometry, part
determination of accurate positions*

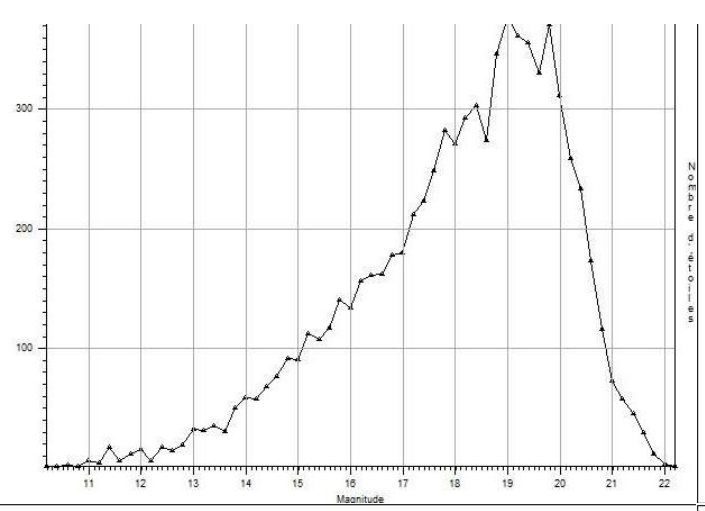
PRIMARY STAR IN EACH SELECTED AREA

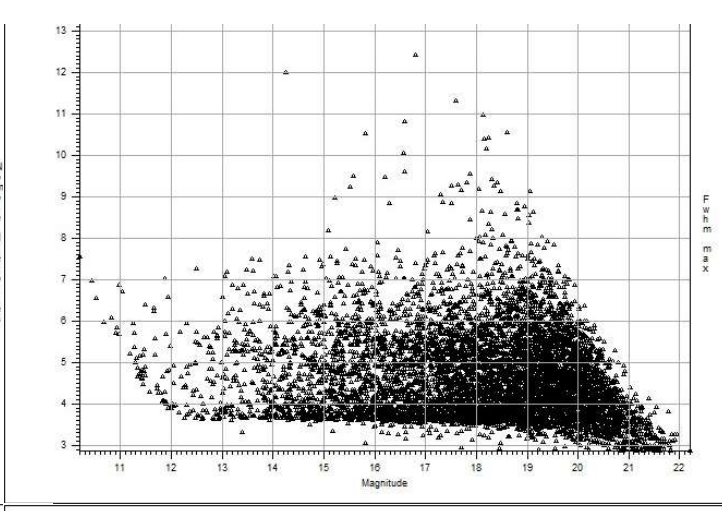
Area	*Star*	*Mag.*	*1950.0*	*2000.0*
SA 51	SAO 79445	9.1	7h 27.5m, +29° 56′	7h 30.6m, +29° 50′
SA 57	SAO 82672	8.1	13h 6.3m, +29° 39′	13h 8.6m, +29° 23′
SA 68	SAO 91810	8.2	0h 14.0m, +15° 34′	0h 16.6m, +15° 50′

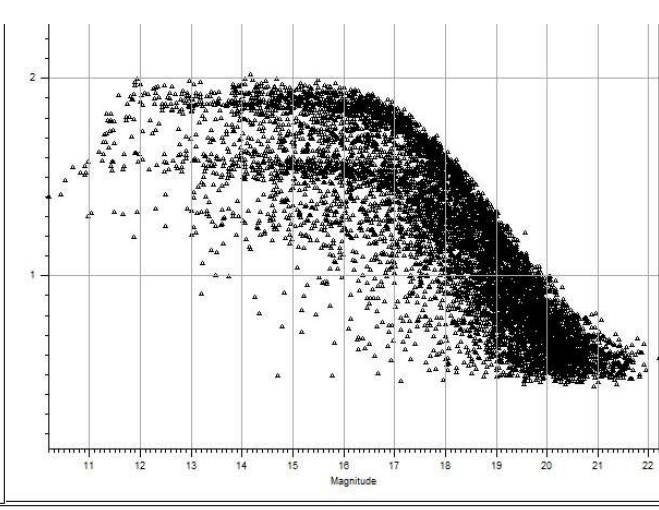


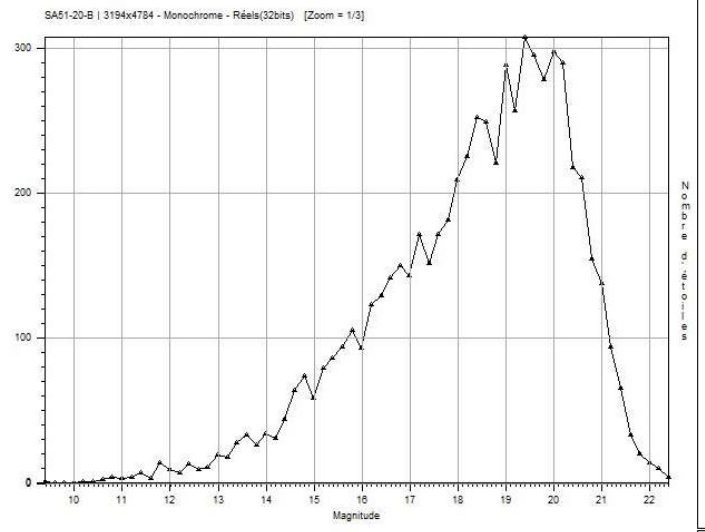
5 stacked 60s exposures
500 mm aperture
1400 mm focal length
IMX455 CMOS detector
less than 1,5^{e} rms noise

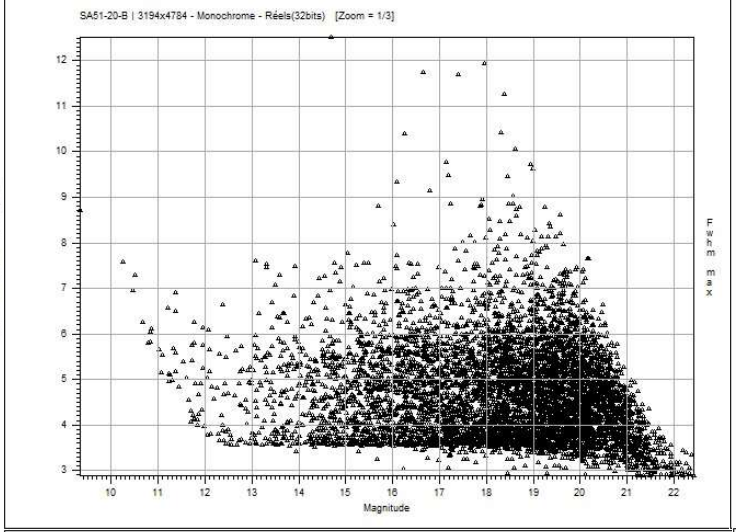
Thierry Midavaine

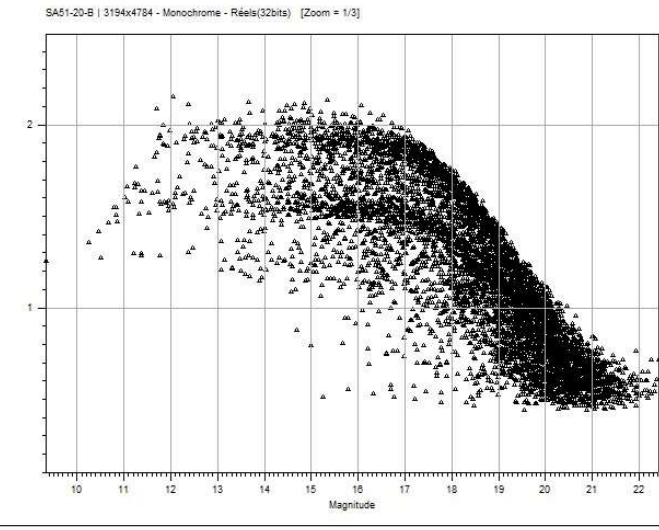

Magnitude
Nombre d'étoiles

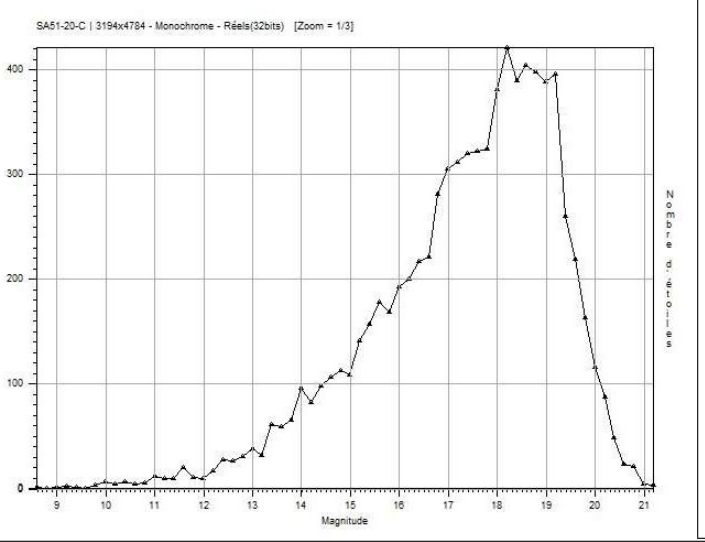

Magnitude
Fwhm max

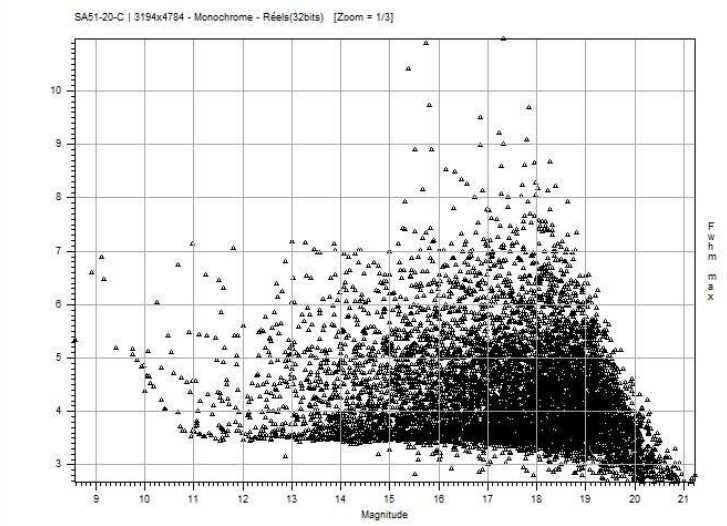

Magnitude

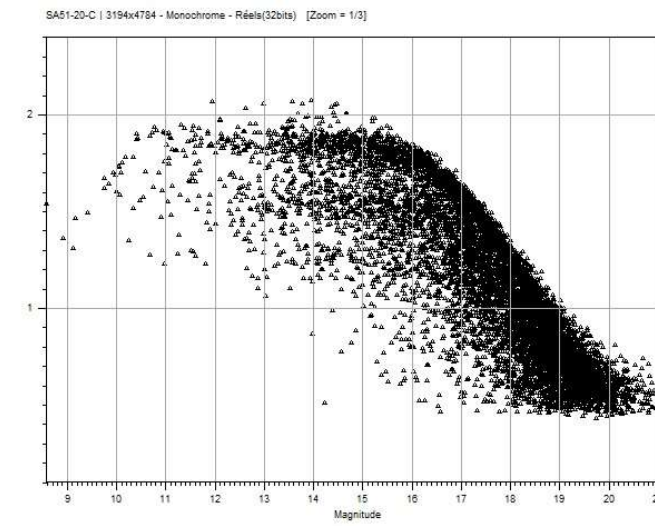

SA51-20-B | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude
Nombre d'étoiles

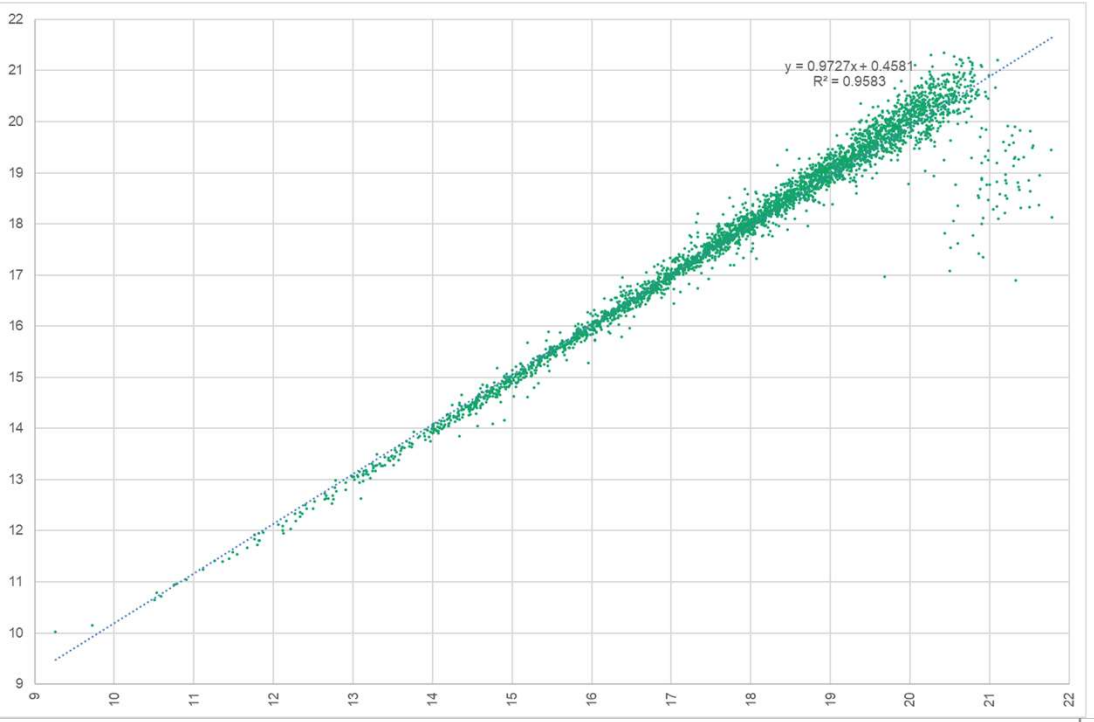

SA51-20-B | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude
Fwhm max

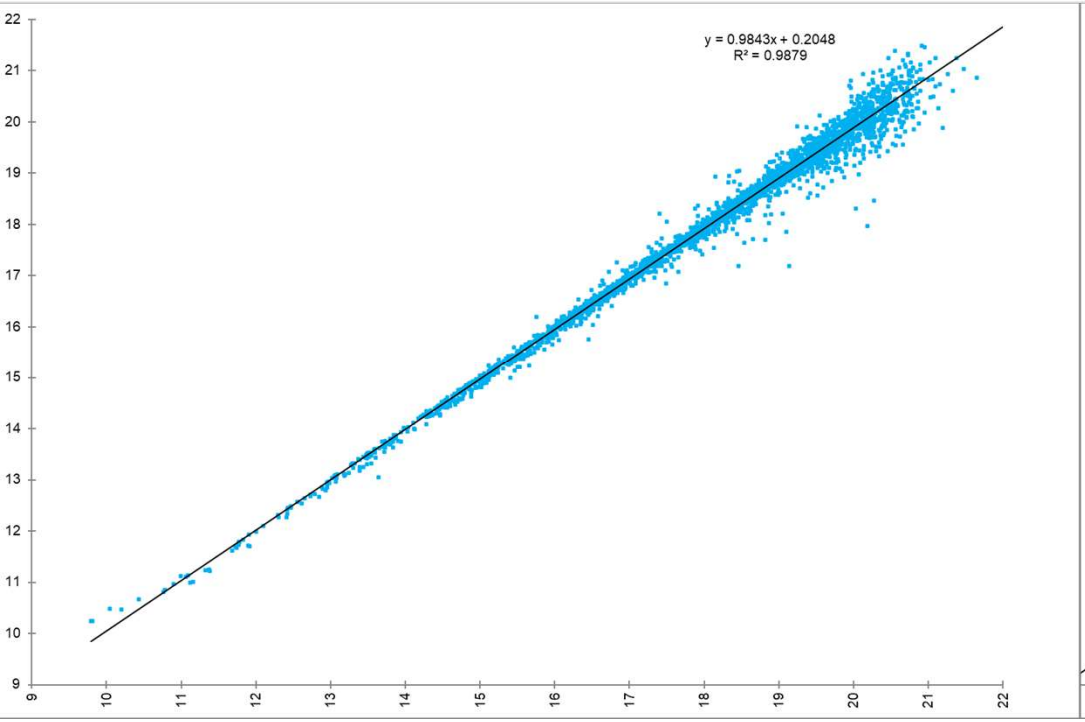

SA51-20-B | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude

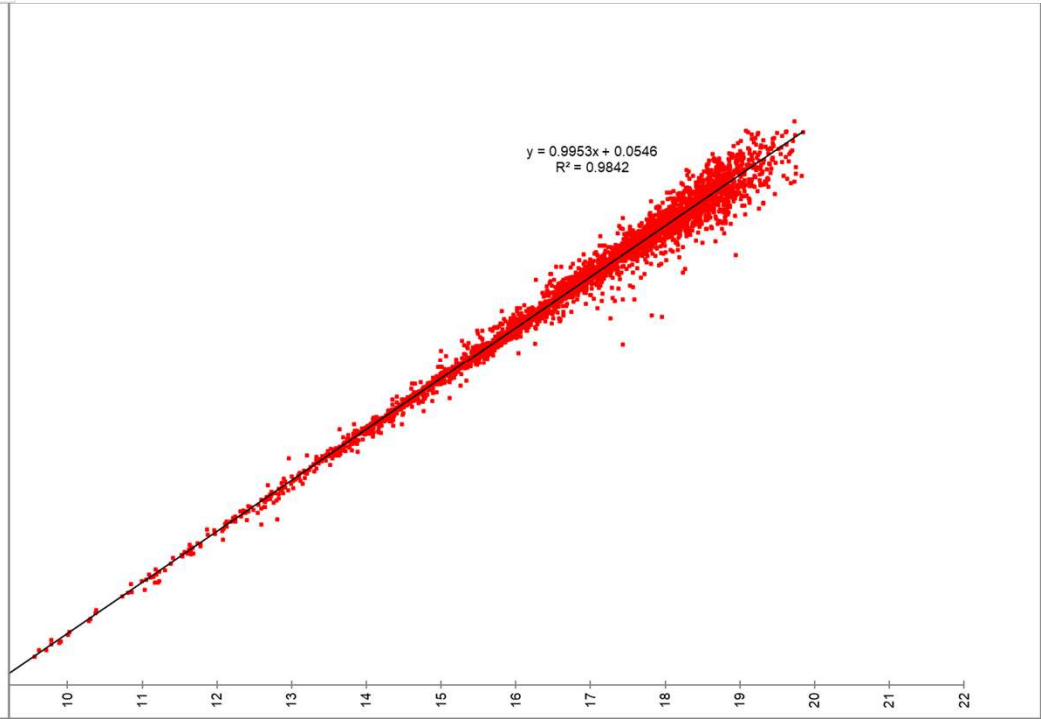

SA51-20-C | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude
Nombre d'étoiles


SA51-20-C | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude
Fwhm max


SA51-20-C | 3194x4784 - Monochrome - Réels(32bits) [Zoom = 1/3]
Magnitude


y = 0.9727x + 0.4581
R² = 0.9583


y = 0.9843x + 0.2048
R² = 0.9879


y = 0.9953x + 0.0546
R² = 0.9842

RAPAS step 2 : Spectrograph to release alert SED

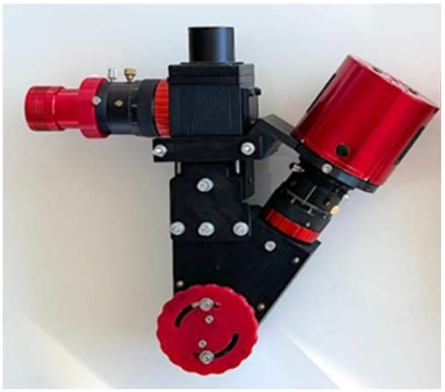
Following the candidate detection, localisation and G, Gbp and Grp magnitudes, caracterise the alarm with its spectral energy distribution :

- Reject false alarm
- Classify alert
- Release the SED :

  - Detect continuum blackbody like distribution and equivalent Temperature
  - Detect continuum not fitted to one blackbody
  - Detect temperature variation
  - Detect emission lines : H, Si,…
  - Detect broad absortion bands
  - Detect Balmer or Lyman spectral break and measure z shift.
  - …

Design high luminosity very low dispersion spectrograph able to meet high upper limit magnitude (20 targeted) with >400mm diameter telescopes with 1 hour exposure.

Realisation then test on 2 spectrograph prototypes



- Alpy 200

Fitted with a 200g/mm high efficiency transmittive grating instead of grism de 600g/mm with a 2 slit width

- Realisation of a Star'Ex VLR (Very Low Resolution)

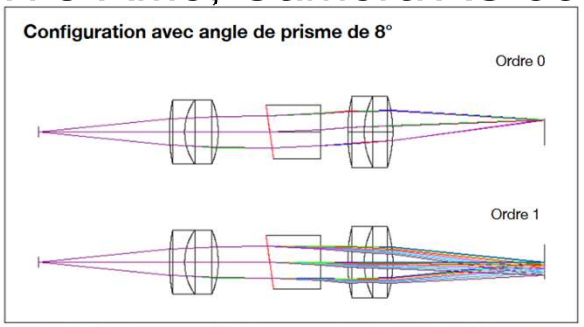
Equiped with a reflective 150 g/mm grating and optional objective focal length reduction from 80mm to 40mm

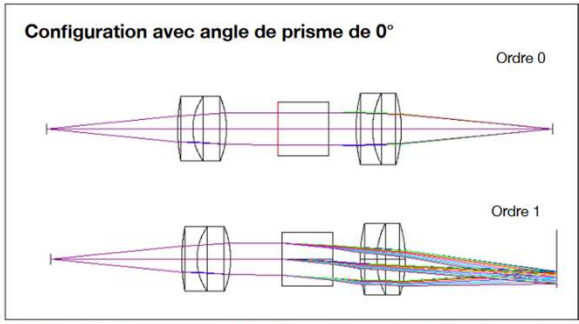
In 2024 test the 2 spectropgraphs

End 2024 validate or iterate spectrograph def to equip 5 to 10 telescopes in RAPAS network

Test StarEx 150t/mm Christian Buil

- Lunette de 80mm sur une monture ZWO AM5, Camera ASI533MM sans fente ouverture de 2mm
- 45mn d'exposition
- Magnitude 13,3

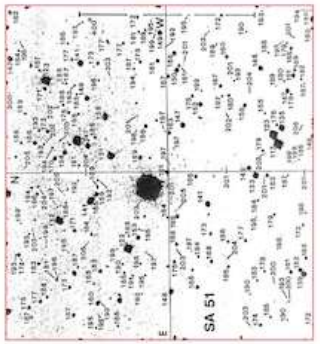




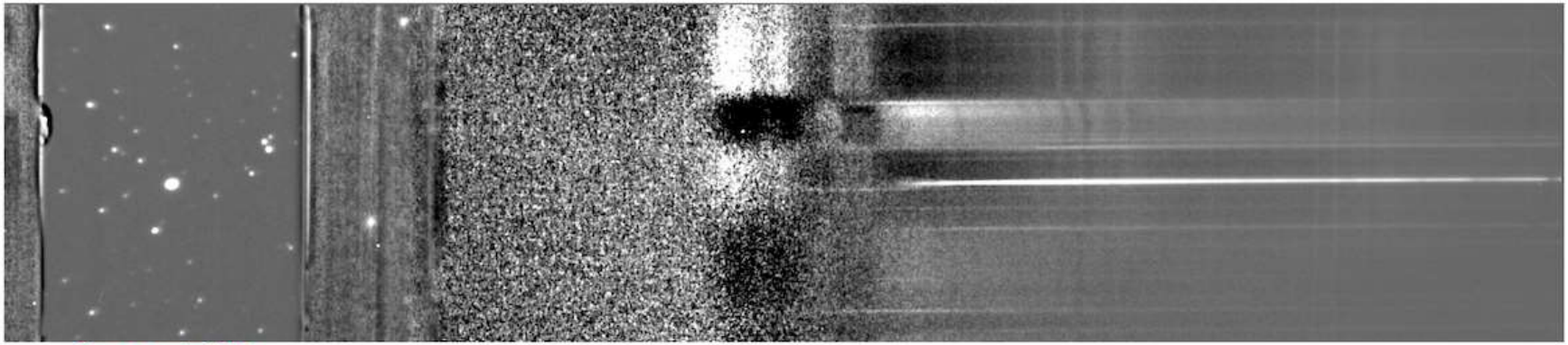
Selected Area 51 (7h30m39s, +29°49'44", 2000.0) - **Test spectrographie avec fente large (Star'Ex)**

Christian Buil - 09/03/2023

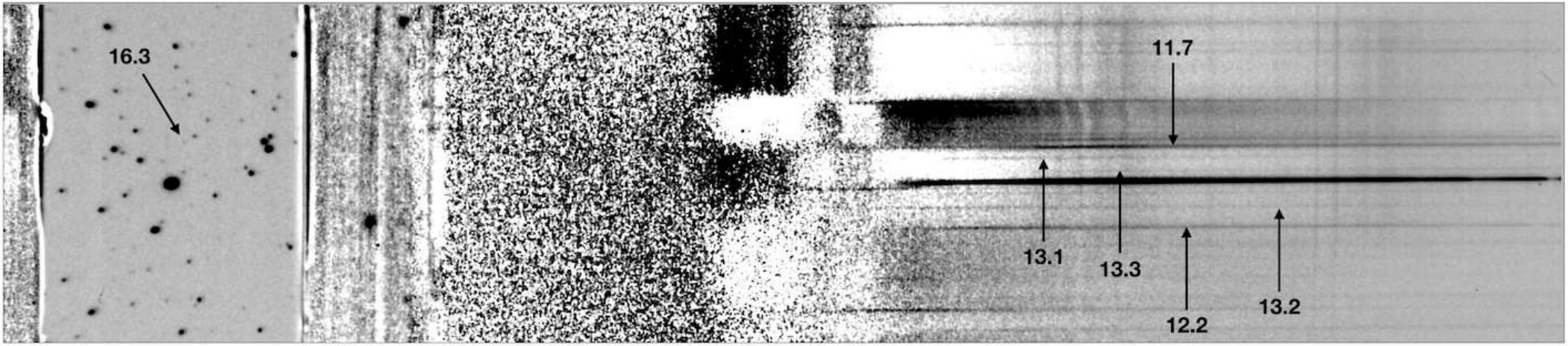
Lunette TS PhotoLine 80 ED (diamètre 80 mm, focale 480 mm) + Star'Ex LR 80x80, réseau 150 mm,
fente large (2.0 mm x 4.5 mm), caméra ASI533MM Pro - Exposition 45 mn (9x300 s) durant la Pleine Lune et en milieu urbain (Antibes)



Carte de champ SA51

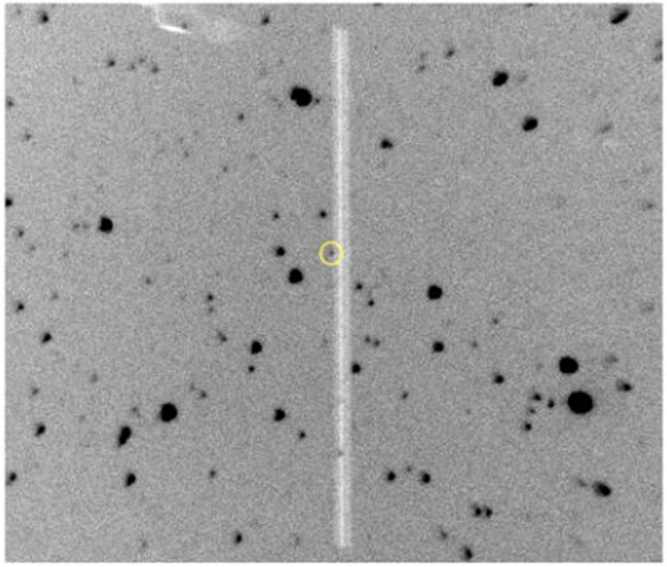


Champ spectro SA51



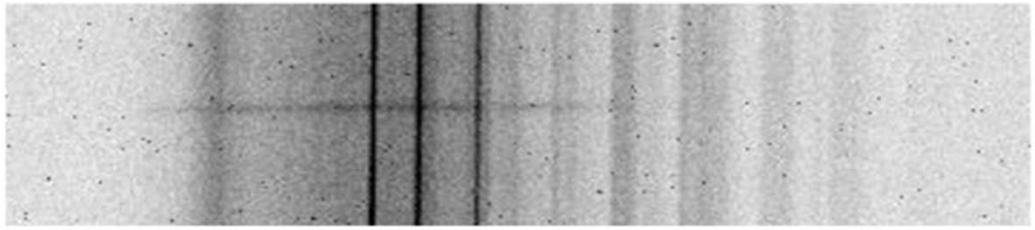
Robin Leadbeater tests with Alpy 200

SN2023vxt 18.6 r mag 10x600sec C11 f/5



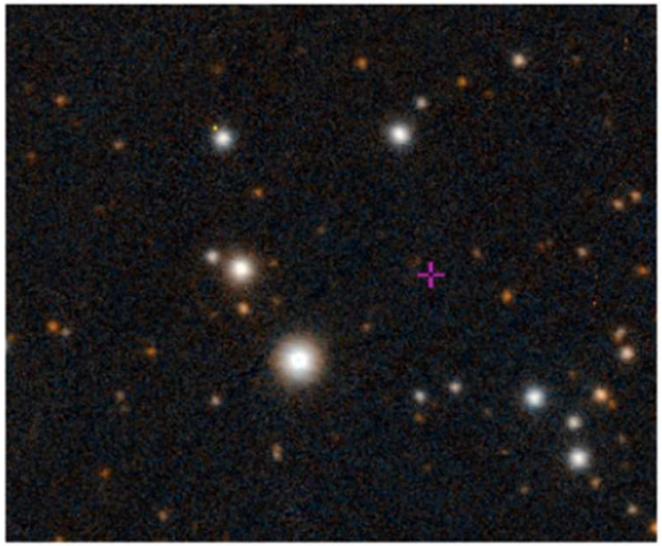
guider image (11x20sec)

SN 2023vxt 11-11-2023



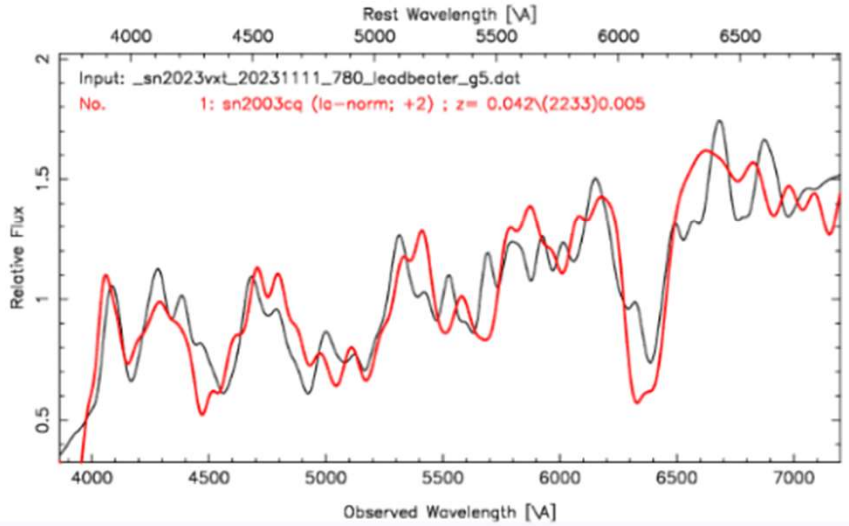
Raw spectrum image including sky background

(Light pollution (LED, NaD) Air glow (Oxygen, NaD lines ,OH molecular emission bands)



Digitised Sky Survey image

https://archive.stsci.edu/cgi-bin/dss_form



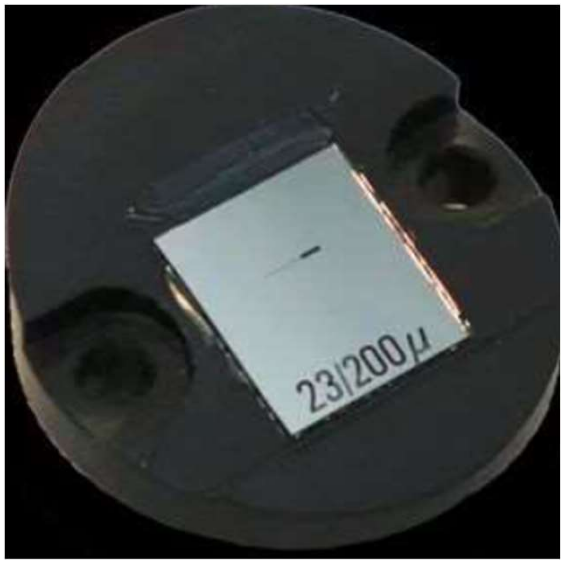
Measured spectrum (black) compared with best match from SNID (red)

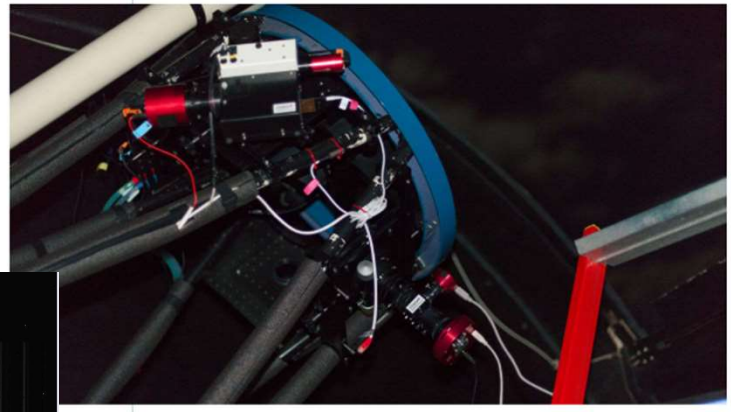
R Leadbeater Three Hills Observatory 20231119

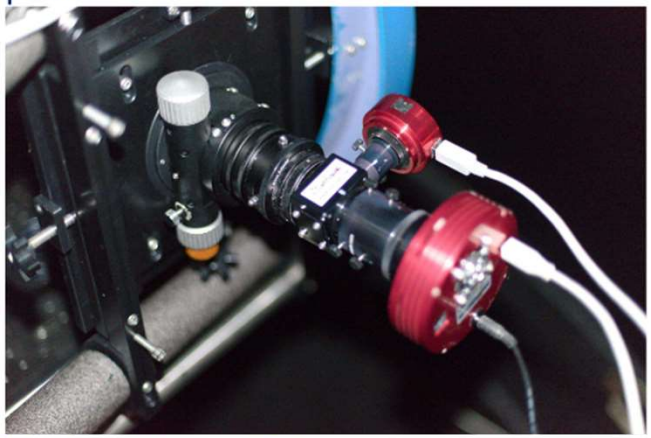
Test Alpy200 au TJMS

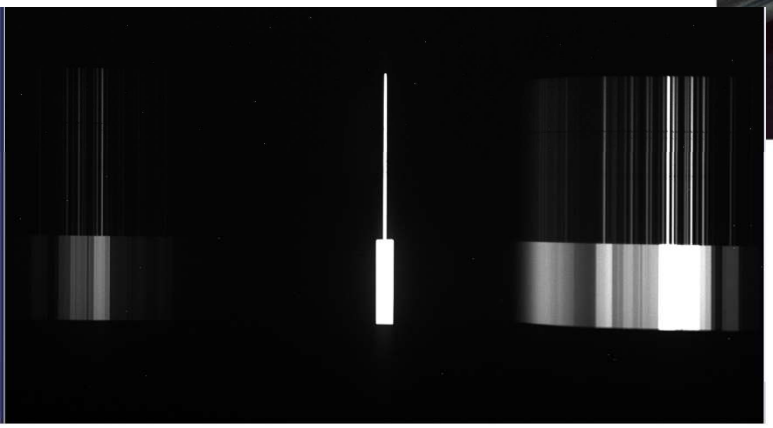
Le montage

- Le TJMS est a f/d=3,3 => utilisation d'un paracorr f/d ~3.8
- Pas de module d'étalonnage à cause du backfocus nécessaire pour le paracorr (remplacé par une bague de plus faible backfocus)
- Module de guidage avec une Asi120
- ALPY200 avec une fente photométrique 23/200 micron
- Camera science : une vénérable atik 314L+ à -10°C
- Guidage sous PhD guiding
- Positionnement et acquisition sous prism



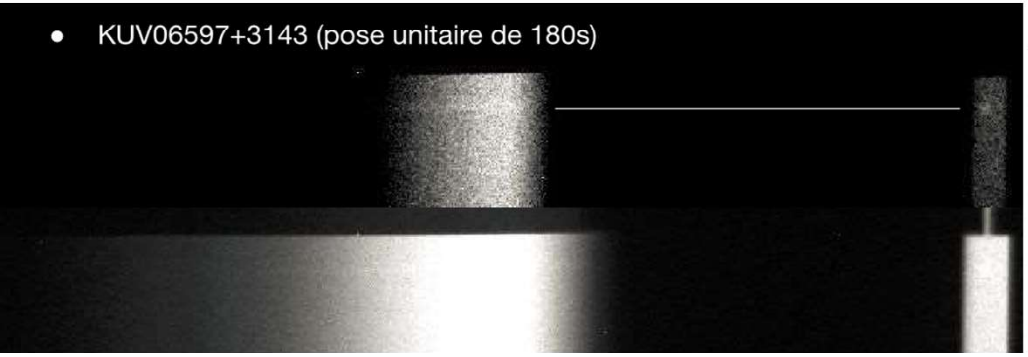


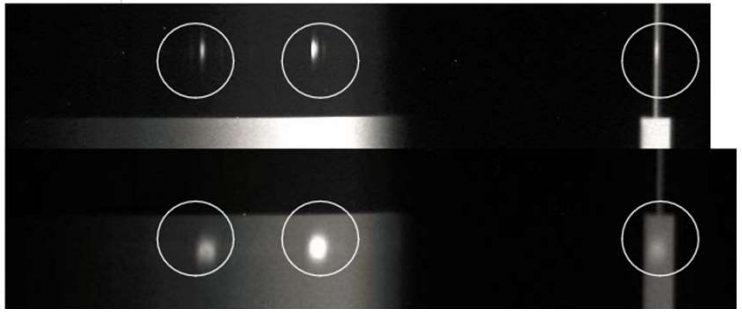




- M1_7 : nébuleuse en émission, Mag ~15.3
- En fente etroite et photométrique
- Pose de 180s
- En fente photométrique, on retrouve la forme des stars analyzers (l'objet se retrouve sur chacune des raies d'emission)

- KUV06597+3143 (pose unitaire de 180s)





Tests Star’Ex VLR au TJMS

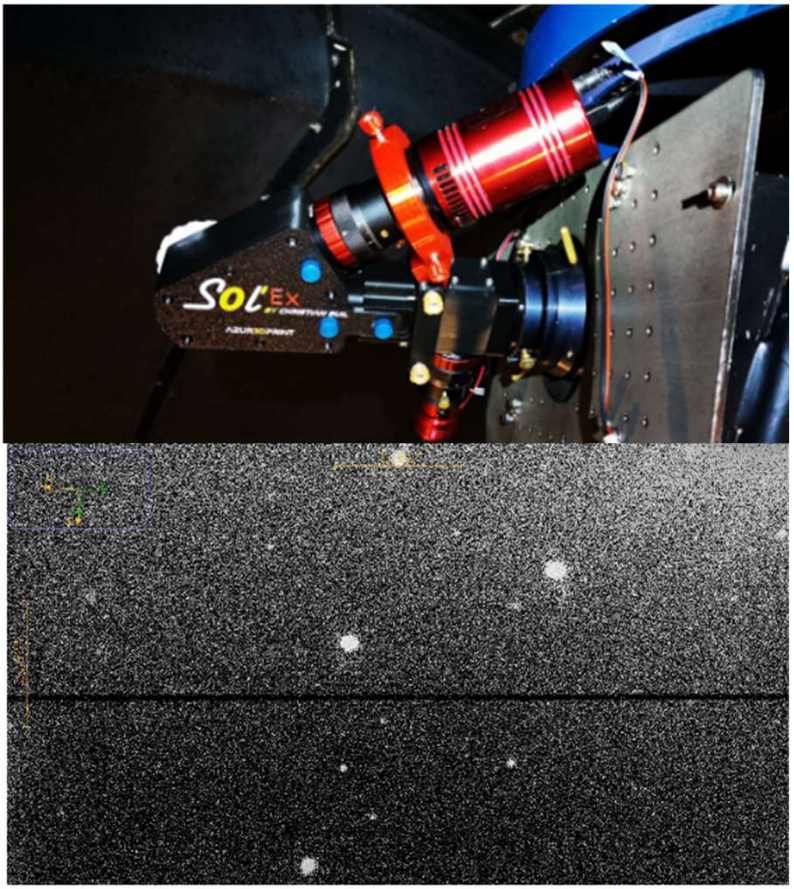
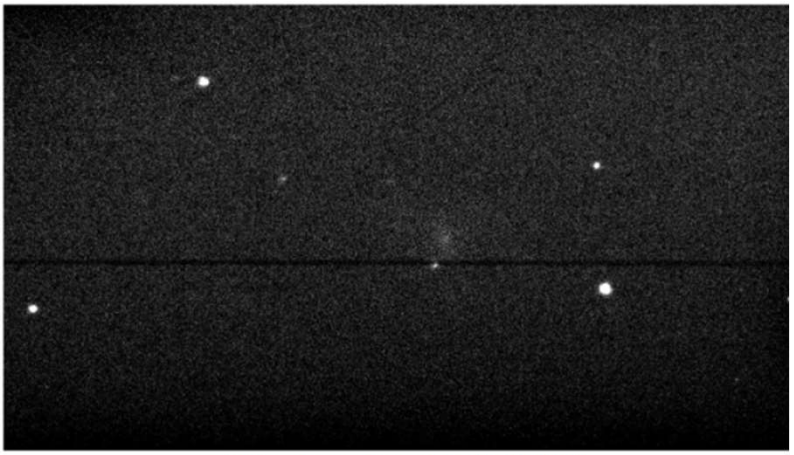
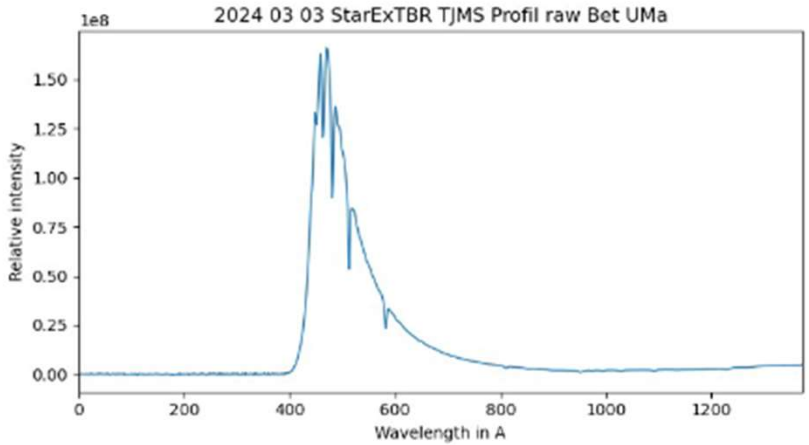


Image du champ de guidage avant centrage de Bet UMa

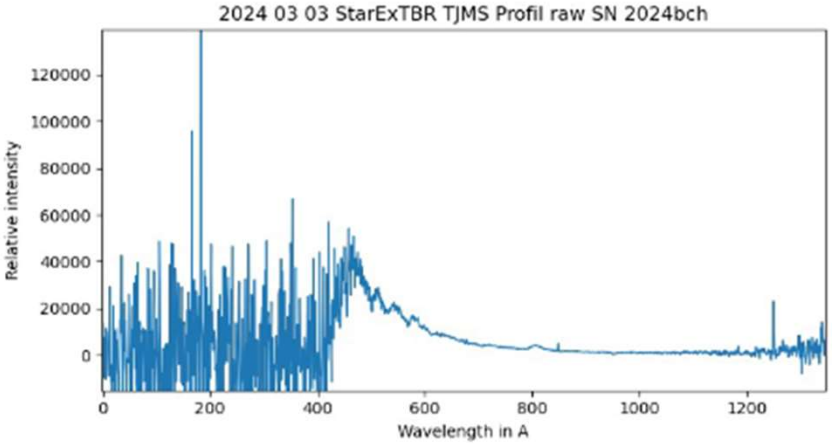


Champ de guidage de SN 2024bch

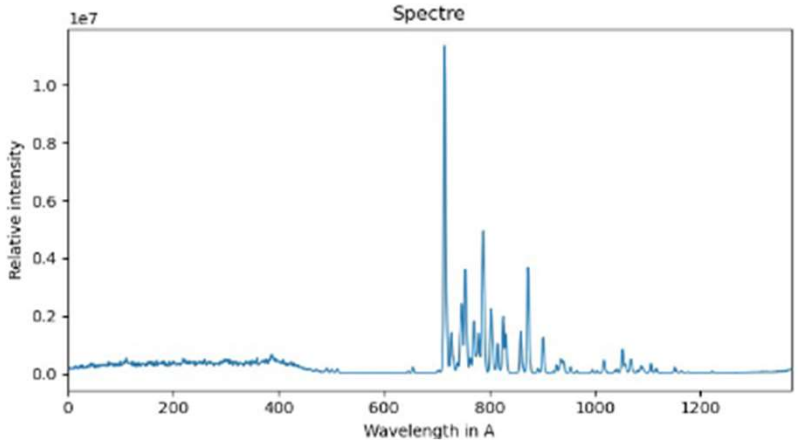
Bet UMa : _betuma_raw.fits

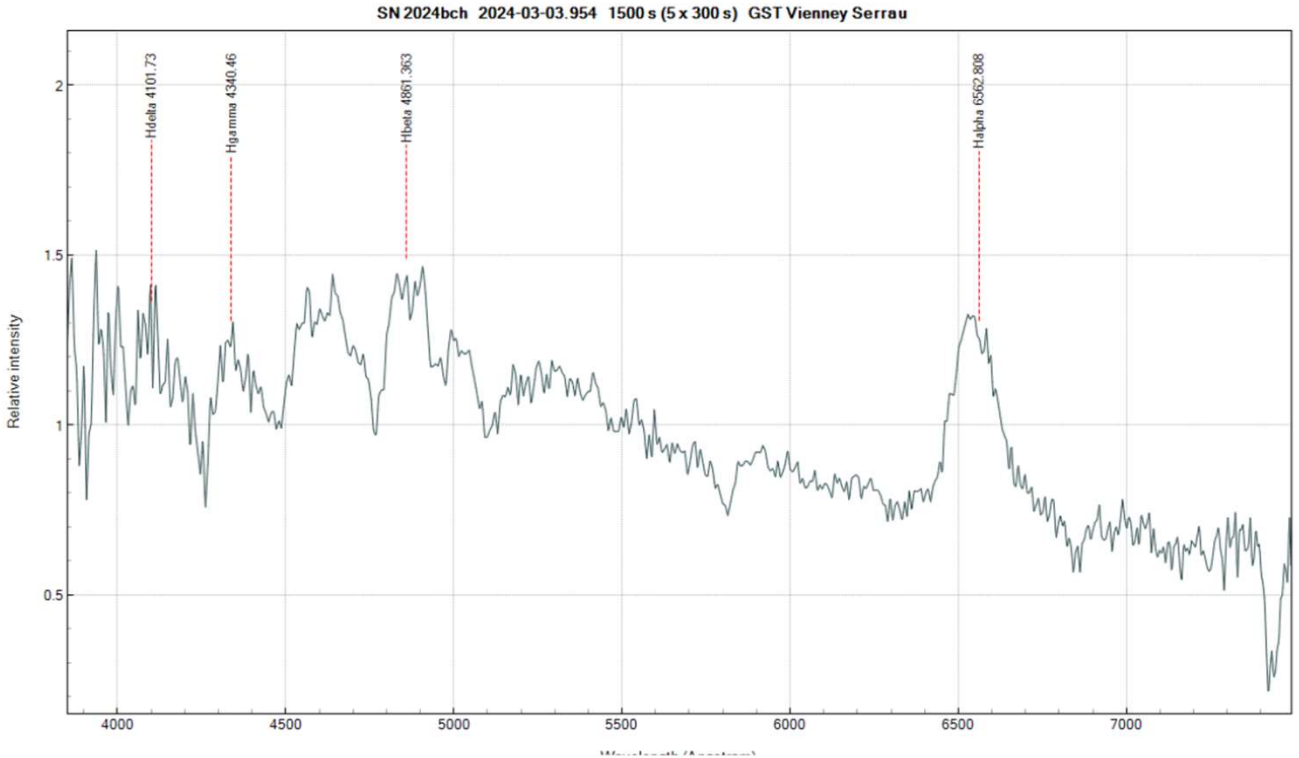


SN 2024bch : __sn2024bch_raw.fits

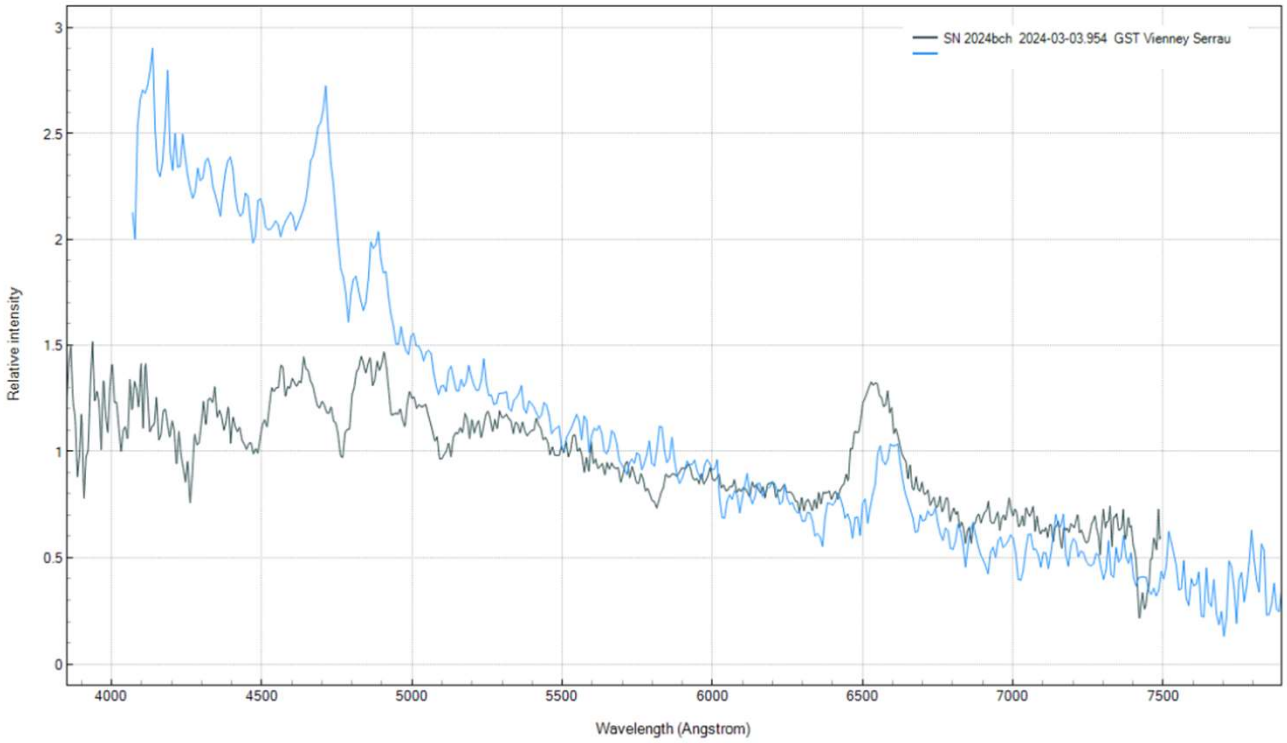


Lampe Calibration Ne : _Ne_raw.fits



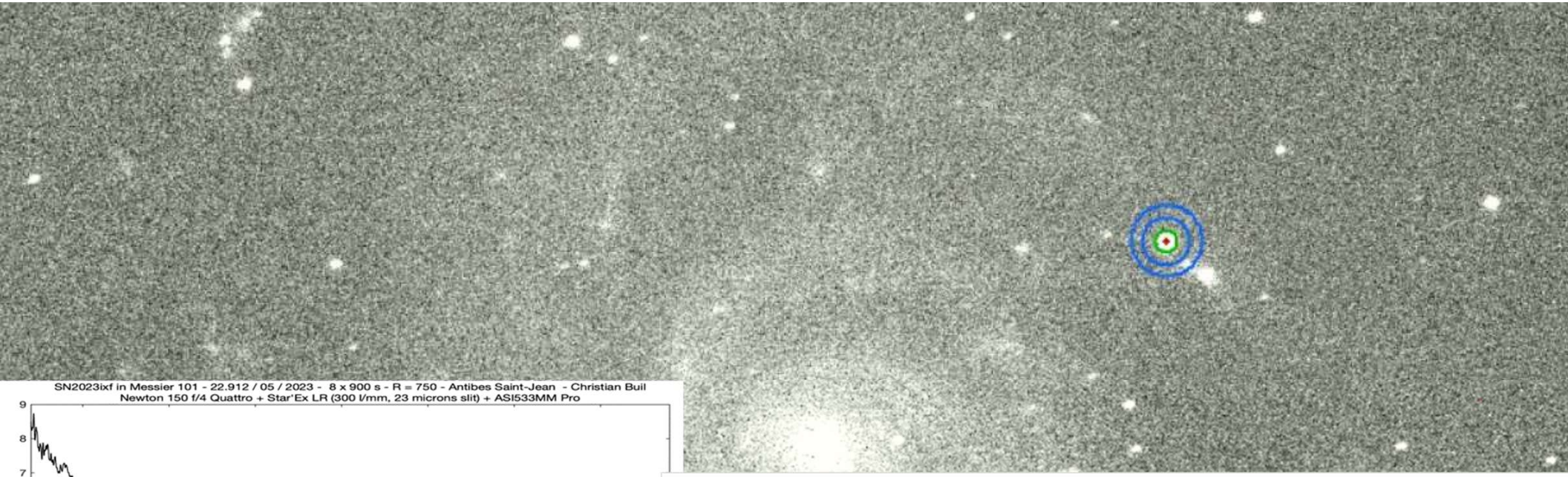


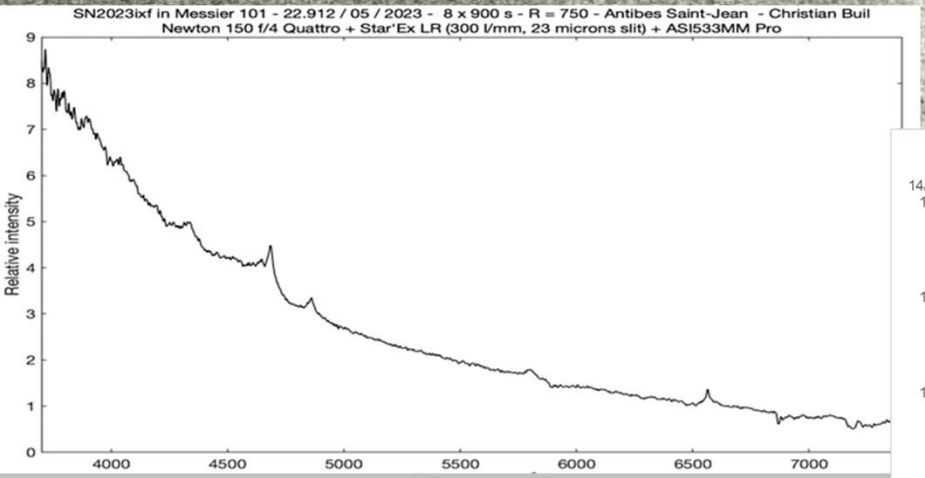
SN2024bch

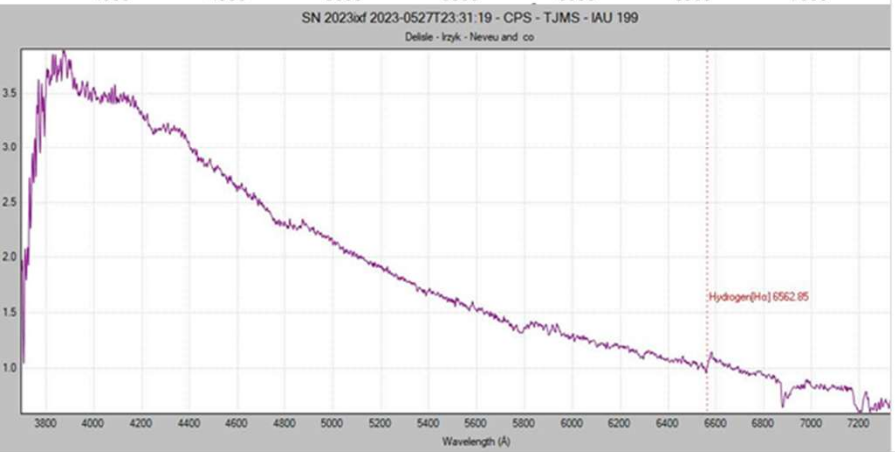


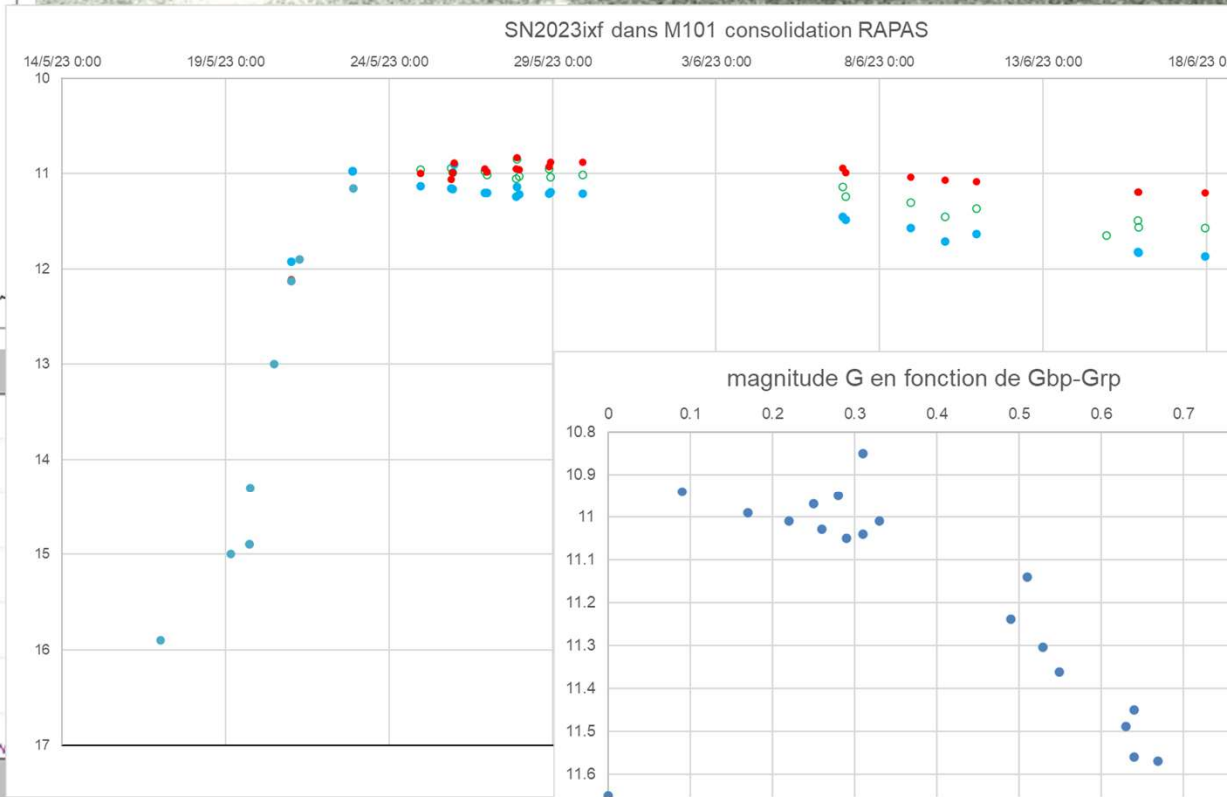
2024-01-29 CBalcon-vs-2024-03-03 GST

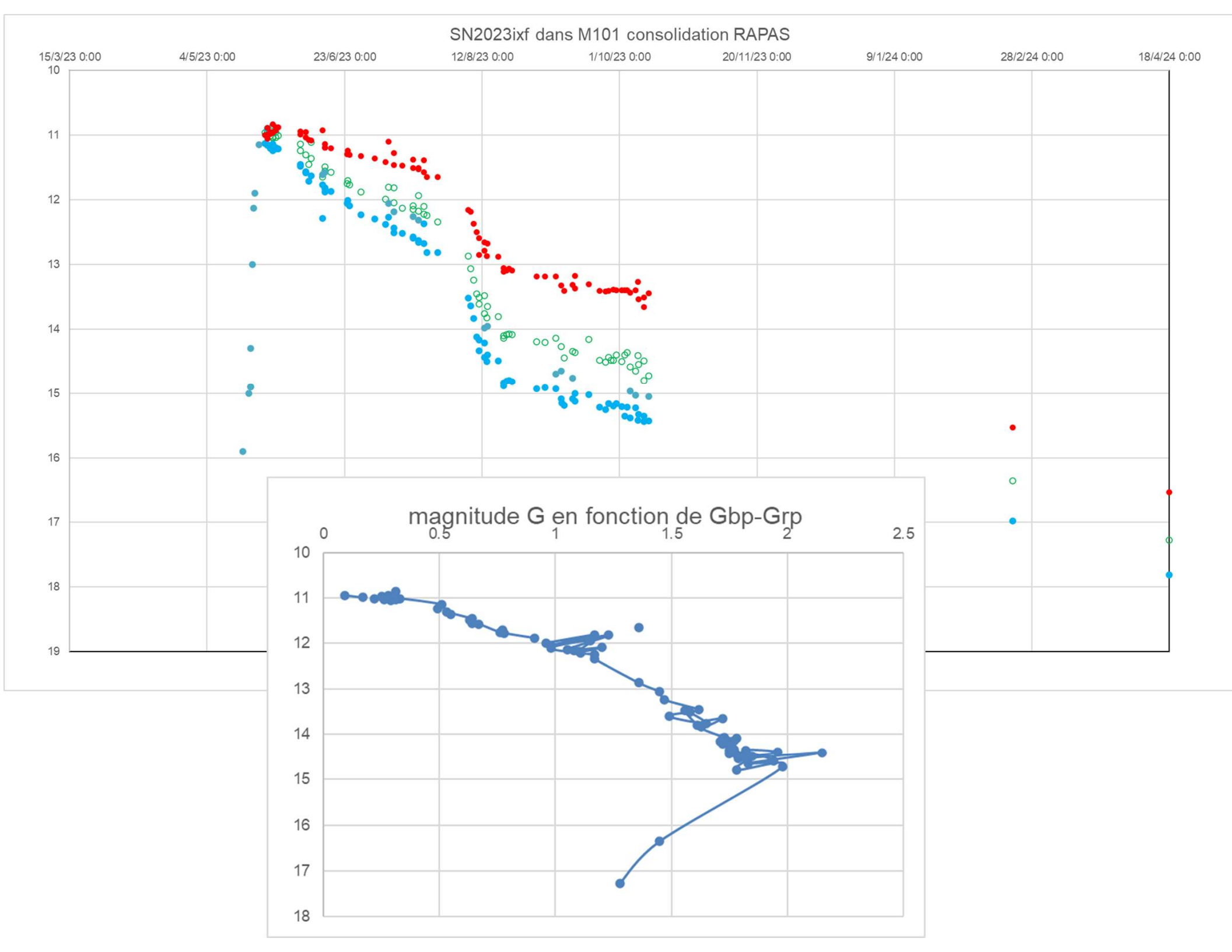
Premiers tests de mobilisation de RAPAS :
SN2023ixf dans M101 découverte le 19 mai 2023 à m=14,90










SN2023ixf dans M101 consolidation RAPAS
15/3/23 0:00
4/5/23 0:00
23/6/23 0:00
12/8/23 0:00
1/10/23 0:00
20/11/23 0:00
9/1/24 0:00
28/2/24 0:00
18/4/24 0:00
10
11
12
13
14
15
16
17
18
19
magnitude G en fonction de Gbp-Grp
0
0.5
1
1.5
2
2.5
10
11
12
13
14
15
16
17
18

Astro-Colibri / RAPAS alert process

- Deliver selected new alerts (1 a day max, 5 a week max) to RAPAS network, then :
  - Detect optical counterpart from multimessenger alerts
  - Deliver candidates RA Dec location, 1as acc with magnitude signature G Gbp Grp or color index
  - Classify each alert as a candidate or false alert
  - Deliver new alerts
- Photometric monitoring of optical alerts : G Gbp Grp color index
- Attach the SED (spectral energy distribution) to each alert to allow classification or rejection
- End of each week alert poll either we continue the monitoring or we stop it.
- Every Friday issue the list of 10 RAPAS targets to follow on the next week

De Astro COLIBRI <astro.colibri@gmail.com>

Pour RAPAS@groups.io, astro.colibri@gmail.com

Réponse à RAPAS@groups.io

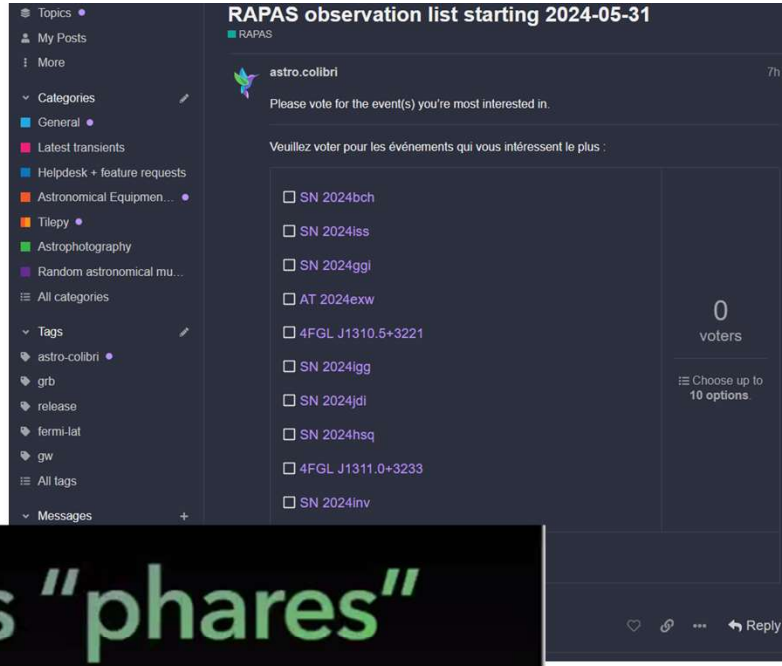
Sujet **[RAPAS] Astro-COLIBRI / RAPAS observation list (2024-05-31)**

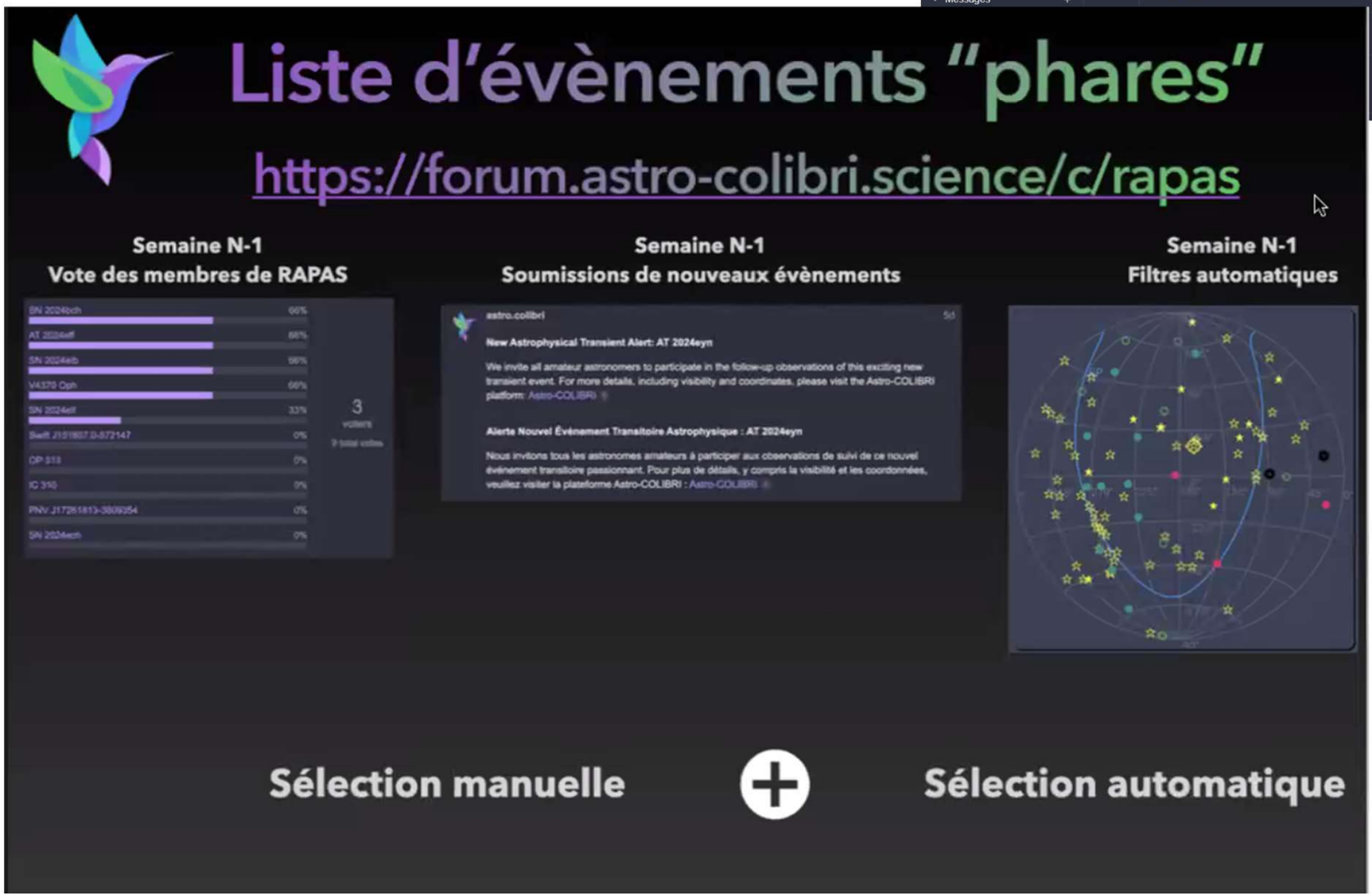
Chers membres du réseau RAPAS,

Nous sommes ravis d'annoncer une nouvelle liste de cibles astronomiques pour l'observation !

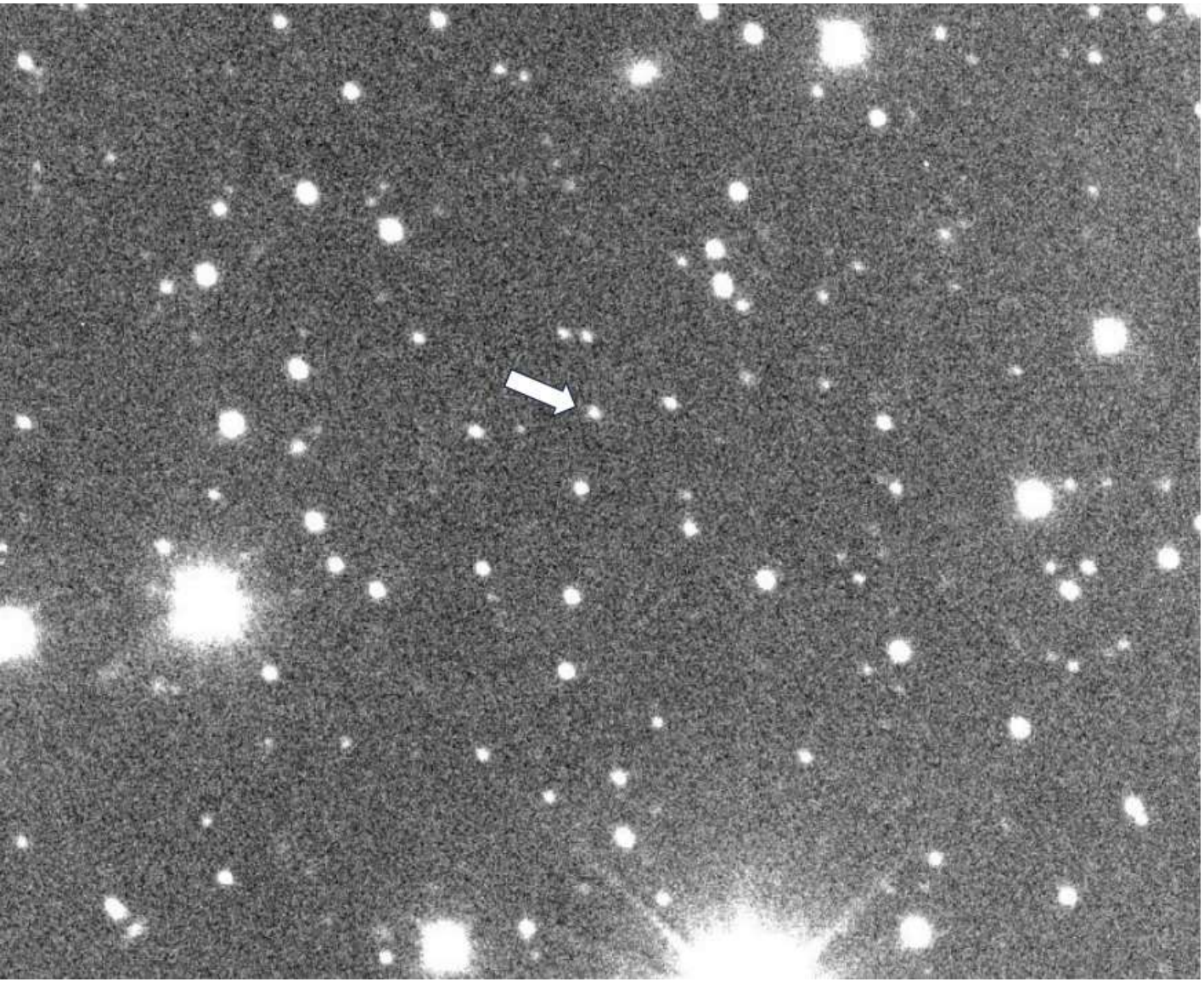
Veuillez visiter le lien suivant pour voir les détails : "RAPAS observation list starting 2024-05-31"

Ciels dégagés,
L'équipe Astro-COLIBRI





GRB240809A 3 RAPAS observers : Belesta, M. Serrau, A. Leroy



Each RAPAS observers deliver magnitude measurements on a RAPAS shared google spreadsheets

First RAPAS GCN circular : # 37159

TITLE: GCN CIRCULAR
NUMBER: 37159
SUBJECT: GRB 240809A : RAPAS follow-up observations
DATE: 24/08/12 21:51:25 GMT
FROM: Thierry Midavaine at GRANDMA <thierrymidavaine@sfr.fr>

Thierry Midavaine on behalf of the RAPAS network reports (#1) :

P. Martinez and C. Latgé [1], M. Serrau [2] and A. Leroy [3] observed the Gamma-Ray Burst GRB240809A (Evans et al. GCN 37110 ; Want et al.GCN 37113) using [1] ADAGIO N 820mm telescope at Belesta Observatory (IAU A05) equiped with a Moravian CMOS camera, [2] SC 300mm telescope at Vidauban [A77] equiped with a QHYCCD CMOS camera and [3] SC 350mm telescope at Madagascar equiped with a ZWO ASI CMOS camera. [1] and [2] are equiped with the set of 3 RAPAS filters meeting the Gaia G, Gbp and Grp photometric bands. The FITS files are reduced with the Gaia photometric catalog in respective spectral bands.

The afterglow is detected RA(J2000) = 5h 50m 10.55s ; Dec(J2000) = -02d 19' 03.3" [1]

MJD (mid)	Gaia filter band	mag.(Gaia)	RAPAS station
60531.66128	G	19.75 ± 0.14	[3]
60531.86667	Grp	20.48 ± 0.60	[1]
60531.86736	G	20.52 ± 0.47	[2]
60531.87778	Gbp	20.10 ± 0.32	[1]
60531.89444	G	20.58 ± 0.19	[1]

RAPAS (https://proam-gemini.fr/rapas/) is a new ProAm collaboration funded by Paris Observatory, delivering to a network of french amateur observatories a set of 3 filters meeting the Gaia spectral bands. This network is dedicated to deliver data in the Gaia photometric system on selected astrophysical alerts by Astro-COLIBRI (https://astro-colibri.com/) or from Gaia alerts.

RAPAS dates

- Tous les vendredis soirs vote sur la sélection des alertes RAPAS suivies la semaine suivante
- SF2A annual congress, ProAm Workshop
- Fall 2024 2nd filter batch distribution and spectro prototype tests
- 16-24 septembre 3rd Workshop Astro-Colibri at Institut Pascal Orsay
- Gaia Workshop 30 sept 2 oct 2024 ?
- RAPAS 3rd workshop 14-15 décembre 2024
- 2025 API proposition and IAU support ?

Conclusions : RAPAS 2024 - toward RAPAS 2025

Photometry

- Assess the photometric accuracies of each observer HW&SW setup and of the global network
- Publish a RAPAS paper on the network and the photometric assessed accuracy
- Test phase of the Astro-Colibri alerts filtered for the RAPAS network
- Launch photometric monitoring of astrocolibri sources and train RAPAS observers and to check capabilities
- GaiaFUN SSO alert – This is to be retracted due to Gaia-ZTF has wipped out the 21 mag asteroid alerts
- Launch optical counter part retrieval on multimessenger alerts
- Deliver the data : Alertes Gaia, Télégrammes, GCN, KNC,… ?

Spectroscopy

- Tests the two spectrograph prototypes mag upper limit and resolution
- Deliver the first SED on detected alerts
- Fix the spectrograph definition attached to Telescope setup in the RAPAS network

2024 funding

- Produce and deliver a second batch of ABC filters
- Create a RAPAS alert process from AstroColibri alerts through a filter fitted to RAPAS capabilities
- 14-15 dec 2024 3rd RAPAS Workshop at Paris Observatory and on ZOOM

2025 funding

Operate the delivery pipeline V1 delivering Data :

From Astro-Colibri alerts, selection, Vivona support, Optical localisation of candidates
magnitude of the alert and colour index delivery
build up the SED attached to the alert process
False alert rejection
Alert monitoring

- Launch design and manufacture a 3rd batch of Gaia filters : optimised and enhanced design
- Launch the manufacturing of small batch of SED high magnitude able spectrographs
- Enlarge on an international scale the RAPAS network ? Via IAU PARC WG ?
- GAIA DR4 dec 2025

Bibliographie

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