C-Munipack 使用说明

C-Munipack: <u>http://c-munipack.sourceforge.net/, C-Munipack</u>是基于 Munipack 开发的 CCD 测 光数据处理软件,支持 Windows 和 Linux 操作系统,支持图形化用户界面和命令行两种模 式,特别是图像化用户界面使用起来特别方便。

C-Munipack 最大的优点是可以在 windows 下运行,并且良好的图形化界面非常容易上手, 但是目前不支持同时多波段的测光,只能单波段数据处理。大体步骤为合并本底,暗流和平 场,目标图像本底、暗流和平场校正,选择目标星、比较星和校验星进行孔径测光,最终得 到目标星较差测光的结果。下面介绍下详细的步骤。

首先打开 C-Munipack, 出现如下界面:

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第一步,合并平场,打开 Project,新建 New Project, Project name: bias(命名可根据自己 习惯),选择合适的文件夹,例如数据所在文件夹, Predefined profiles 选择 Master bias frame,如下图:

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选择 OK, 接下来选择 Frame 选项卡》Add individual frames, 选择待合并的所有本底文 件, 接下来点击 Reduce》Express reduction 选项卡, 出现以下画面, 👆 bias - Muniwin \times Project Frames Reduce Make Tools Help | 計 計 🔚 🔍 | 🇶 🤹 🗸 | **** Frame # Date and time (UTC) Exposure Filter Stars found Stars matched Status 1 2018-03-14 16:35:29 0.000 ٠ 2018-03-14 16 🎗 Express reduction 2 ٠ × 2018-03-14 16 3 Process 2018-03-14 16 4 all files in current project • 5 2018-03-14 16 selected files only 2018-03-14 16 • 6 Execute 2018-03-14 16 • 7 Fetch/convert files 8 2018-03-14 16 Grayscale (R+G1+G2+B) \sim 2018-03-14 16 9 2018-03-14 16 10 <u>H</u>elp Cancel <u>0</u>K 点击 OK, 然后点击 Make master bias frame, 然后点击 save, 这时合并本底完成。

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下一步,合并暗流,新建 Project, Project name: dark(命名可根据自己习惯),选择合适的文件夹,例如数据所在文件夹,Predefined profiles选择 Master dark frame,如下图:

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√ 4	2018-03-14 16:35:46			
√ 5	2018-03-14 16:35:52	Predetined profiles		
√6	2018-03-14 16:35:58	V Light curve		
√7	2018-03-14 16:36:04	B Master bias frame		
√8	2018-03-14 16:36:10	D Master dark frame		
√ 9 :	2018-03-14 16:36:15	F Master flat frame		
✓ 10	2018-03-14 16:36:21	CCD frame merging		
		👷 Test and debug		
		-		
		Edit profiles		
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接下来载入数据,选择Frame选项卡》Add individual frames,选择待合并的所有暗流文件,然后点击Project settings 按钮,选择Calibration,修改为Advanced (bias+scalable dark +flat),如下图:



点击 OK, 接下来点击 Reduce》Express reduction 选项卡, 出现以下画面, 勾选 Bias-frame correction, 点击 OK 合并暗流。

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• 2	2018	In all files in current project	
• 3	2018-	○ selected files only	
• 4	2018-	Execute	
• 5	2018-	☑ Fetch/convert files	
• 6	2018-	Grayscale (R+G1+G2+B)	
• 7	2018-	☑ Bias-frame correction	
• 8	2018	E:\20180319\masterbias.fts Browse	
• 9	2018-		
• 10	2018-	<u>H</u> elp <u>Cancel OK</u>	

然后点击 Make master dark frame,然后点击 save,这时合并暗流完成。

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Bä	2	2018-03-14 15:39:16	50.000	Bias correction OK	
B	3	2018-03-14 15:40:58	50.000	Bias correction OK	
B 4	4	2018-03-14 15:42:39	50.000	Bias correction OK	
B	5	2018-03-14 15:44:21	50.000	Bias correction OK	
B	6	2018-03-14 15:46:02	50.000	Bias correction OK	
B	7	2018-03-14 15:47:44	50.000	Bias correction OK	
B	в	2018-03-14 15:49:25	50.000	Bias correction OK	
B	9	2018-03-14 15:51:07	50.000	Bias correction OK	
B	10	2018-03-14 15:52:48	50.000	Bias correction OK	

E:\20180319\20180314-001dark-50s.fit

下一步,合并平场,新建 Project, Project name: flatN(命名可根据自己习惯),选择合适的文件夹,例如数据所在文件夹, Predefined profiles选择 Master flat frame,如下图:

...i



点击 OK, 接下来载入数据, 选择 Frame 选项卡》Add individual frames, 选择待合并的 所有平场文件, 然后点击 Project settings 按钮, 选择 Calibration, 修改为 Advanced (bias+scalable dark +flat), 如下图:

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Fra 😰 Project settings				×		
Project 'dark'	Calibration					
Camera	Calibration scheme					
Source frames	 Standard (dark + flat) Advanced (bias + scalable dark + flat) 					
Calibration						
Master dark						
Files and directories						

点击 OK, 接下来点击 Reduce》Express reduction 选项卡, 出现以下画面, 勾选 Bias-frame correction 和 Dark-frame correction, 点击 OK 合并平场。

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• 6	2018-03-18	E:\20180319\masterbia	s.fts	Browse		
• 7	2018-03-18	Dark-frame correction				
89	2018-03-18	E:\20180319\dark\mast	erdark.fts	Browse		
• 10	2018-03-18	Help	Cancel	<u>О</u> К		

然后点击 Make master flat frame,然后点击 save,这时合并平场完成。

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D 1	2018-03-18 12:57:49	4.040 N		Dark-frame correction	on OK		
D 2	2018-03-18 12:58:11	4.010 N		Dark-frame correction	on OK		
D 3	2018-03-18 12:58:34	4.000 N		Dark-frame correction	on OK		
D 4	2018-03-18 12:58:55	4.000 N		Dark-frame correction	on OK		
D 5	2018-03-18 12:59:17	4.000 N		Dark-frame correction	on OK		
D 6	2018-03-18 12:59:39	4.000 N		Dark-frame correction	on OK		
D 7	2018-03-18 13:00:01	4.000 N		Dark-frame correction	on OK		
D 8	2018-03-18 13:00:24	4.400 N		Dark-frame correction	on OK		
D 9	2018-03-18 13:00:47	5.330 N		Dark-frame correction	on OK		
D 10	2018-03-18 13:01:10	5.030 N		Dark-frame correction	on OK		
D 11	2018-03-18 13:01:56	6.910 N		Dark-frame correction	on OK		<u> </u>

下一步,目标图像进行本底、暗流和平常校正,以及 photometry (photometry 是寻找视 场中所有的星并得出它们的亮度)和 matching (matching 是以一幅图中的星为模板去寻找 其他图中相应的星)。新建 Project, Project name: SWSex (命名可根据自己习惯),选择合适的文件夹,例如数据所在文件夹, Predefined profiles 选择 Light curve,如下图:



点击 OK,接下来载入数据,选择 Frame 选项卡》Add individual frames,选择待处理的 所有目标图像文件,然后点击 Project settings 按钮,选择 Camera,设置 CCD 的 Readout noise 和 gain,选择 Calibration,修改为 Advanced (bias+scalable dark +flat),选 择 Star detection,对其中的 FWHM 和 Detection threshold 进行修改,这一步的修改非 常关键,会直接影响到 Photometry 和 Matching,如果这两步出现问题可以修改这两个参 数 (默认为 3 和 4),其他的参数,如 Photometry 中可以更改背景的内外半径 (Inner radius 和 Outer radius),Matching 里面有算法和 Standard matching parameters 设 置,这些设置会影响 Matching,Find variables 主要是为找变星设置参数,Observer 可 以设置台址及其赤经赤纬 (有时可以从文件头读取)。所有参数设置好后点击 Reduce》 Express reduction选项卡,出现以下画面,勾选 Bias-frame correction、Dark-frame correction、Flat-frame correction 以及 Photometry 和 Matching (Matching 是要选择 一副图像作为模板,一般选择星最多的一幅,这里以第一幅图像为例),点击 OK。

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6 2018	03-19 15:00: 0 seconds More		
• 7 2018	.03-19 15:01; 🗹 Bias-frame correction		
• 8 2018	03-19 15:02: E:\20180319\masterbias.fts Browse		
• 9 2018	-03-19 15:03: 🔽 Dark-frame correction		
• 10 2018	03-19 15:04: E:\20180319\dark\masterdark.fts Browse		
• 11 2018	-03-19 15:05:		
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	Photometry		
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Frame # Date			<u>^</u>
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⇔ 2 201	Frame #10:		matched)
⇔ 3 201	Conversion OK		matched)
⇔ 4 201	Exposure duration: 50.00 s		matched)
⇔ 5 201	Dark-frame correction OK		matched)
→ 6 201	Flat-frame correction OK		matched)
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处理完成,可能会存在一些图像 Matching 没成功,这时最好先检查一下该图像是否是由于 天气原因没匹配成功,如果不是,说明 FWHM 和 Detection threshold 以及 Matching 里面 的一些参数设置有问题,需要重新设置,重新处理。

🕂 SWS	Sex - Muniwin	1							↔		_		×
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⇔ 35	2018-03-19	15:31:08	50.000 N		228	197	Match	ina Ol	K (86	% star	s matc	hed)	
2 36	2018-03-19	15:32:11	50.000 N		89		Coinci	dence	s not	found		,	
2 37	2018-03-19	15:33:14	50.000 N		88		Coinci	dence	s not	found			
⇔ 38	2018-03-19	15:34:16	50.000 N		245	205	Match	ina Ol	K (84	% star	s matc	hed)	
关 39	2018-03-19	15:35:20	50.000 N		250	203	Match	ing Ol	K (81	% star	s matc	hed)	~
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e 4	2018-03-19	15:03:41	50.000 N		241	200	Match	ing Oł	(83	% star	s matc	hed)	
⇔ 10	2018-03-19	15:04:45	50.000 N		252	205	Match	ing Oł	K (81	% star	s matc	hed)	
↔ 11	2018-03-19	15:05:48	50.000 N		256	205	Match	ina Oł	< (80	% star	s matc	hed)	~
接下来	天选择目标	示星、比	比较星和	校验量	星进行子	L径测光	。点	击 Pl	ot li	ght c	urve	选项	卡,
🕂 sws	Sex - Muniwin	1							↔		-		\times
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⇔ 3	2018-03-19	14:57:26	50.000 N		162	120	Match	ning O	K (74	% sta	rs mate	ched)	
⇔4	2018-03-19	14:58:29	50.000 N		148	116	Match	ning O	K (78	% sta	rs mate	ched)	
⇔ 5	2018-03-19	14:59:32	50.000 N		199	149	Match	ning O	K (75	% sta	rs mate	ched)	
⇔6	2018-03-19	15:00:35	50.000 N		170	136	Match	ning O	K (80	% sta	rs mate	ched)	
⇔7	2018-03-19	15:01:37	50.000 N		192	147	Match	ning O	K (77	% sta	rs mate	ched)	
⇔8	2018-03-19	15:02:39	50.000 N		186	150	Match	ning O	K (81	% sta	rs mate	ched)	
关 9	2018-03-19	15:03:41	50.000 N		241	200	Match	ning O	K (83	% sta	rs mate	ched)	

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×

205 Matching OK (81 % stars matched)

205 Matching OK (80 % stars matched)

出现以下界面,勾选 Compute heliocentric correction 和 Compute air coefficient (根据自己需要),然后点击 Apply。

\bigvee Plot light curve									
Process									
 all files in current project 									
\bigcirc selected files only									
Light curve options									
Compute heliocentric correction									
Compute air mas	s coefficients								
Ensemble photon	netry								
Show raw instrumental magnitudes									
Select all stars on the reference frame									
Object - designation	SW-Sex	More							
- right ascension	10 15 09	[h m s]							
- declination	-3 08 33	[±d m s]							
Observatory - name	Xingming Observatory	More							
- longitude	87 10 16 E	[d m s E/W]							
- latitude 43 18 04 N [d m s N/S]									
<u>H</u> elp	<u>C</u> ancel	Apply							

出现以下图像,选择 Variable,Comparison 和 Check stars,点击 OK。



下一步需要选择孔径测光的测光孔径,根据图像一般情况下标准差最小的孔径最好,孔径 后面还可以更改,直到选出最佳孔径。







可以根据需要修改横坐标和纵坐标以及修改 Aperture。点击选项卡 View》Table 可以显示表格格式的较差测光结果,并且点击选项卡 File》Save 可将结果保存。

✔ Light curve - Muniwin

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2	24	458197.	1225000	2018-	03-19	9 14:56:24	245819	7.1276	901 2	018-03	3-19 1	5:03:52	-0.0509	B 0.	00644	0.310	16	0.00561	0.36	5113	0.00578	0.005190	1 1.6	5129	38.23
3	24	458197.	1232176	2018-	03-19	9 14:57:26	245819	7.1284	076 2	018-03	8-19 1	5:04:54	-0.0671	5 O .(00627	0.2974	45	0.00554	0.36	5461	0.00560	0.005190	0 1.6	6093	38.33
4	24	458197.	1239468	2018-	03-19	9 14:58:29	245819	7.1291	368 2	018-03	3-19 1	5:05:57	-0.1013	5 O .(00591	0.2648	88	0.00510	0.36	624	0.00536	0.005190	0 1.6	6057	38.43
5	24	458197.	1246759	2018-	03-19	9 14:59:32	245819	7.1298	659 2	018-03	3-19 1	5:07:00	-0.1061	0.0	00582	0.265	38	0.00503	0.37	7149	0.00530	0.005190	0 1.6	i021	38.53
6	24	458197.	1254051	2018-	03-19	9 15:00:35	245819	7.1305	951 2	018-03	3-19 1	5:08:03	-0.1058	0.0	00558	0.2557	71	0.00486	0.36	5155	0.00505	0.005190	0 1.5	985	38.64
7	24	458197.	1261227	2018-	03-19	9 15:01:37	245819	7.1313	126 2	018-03	3-19 1	5:09:05	-0.1124	0.	00550	0.2549	95	0.00476	0.36	5736	0.00502	0.005189	9 1.5	951	38.74
8	24	458197.	1268403	2018-	03-19	9 15:02:39	245819	7.1320	302 2	018-03	8-19 1	5:10:07	-0.1258	9 0.	00544	0.2516	68	0.00469	0.37	757	0.00498	0.005189	9 1.5	917	38.83
9	24	458197.	1275579	2018-	03-19	9 15:03:41	245819	7.1327	478 2	018-03	3-19 1	5:11:09	-0.1325	L 0.	00536	0.2334	48	0.00467	0.36	5602	0.00497	0.005189	9 1.5	884	38.93
10	24	458197.	1282986	2018-	03-19	9 15:04:45	245819	7.1334	885 2	018-03	8-19 1	5:12:13	-0.1012	2 0.	00661	0.2502	25	0.00582	0.35	5147	0.00609	0.005189	9 1.5	850	39.03
11	24	458197.	1290278	2018-	03-19	9 15:05:48	245819	7.1342	176 2	018-03	3-19 1	5:13:16	-0.0986	2 0.	00527	0.2640	06	0.00460	0.36	5268	0.00484	0.005189	8 1.5	817	39.13
12	24	458197.	1297569	2018-	03-19	9 15:06:51	245819	7.1349	468 2	018-03	8-19 1	5:14:19	-0.1044	3 0.	00530	0.2730	09	0.00459	0.37	7758	0.00485	0.005189	8 1.5	785	39.22
13	24	458197.	1304861	2018-	03-19	9 15:07:54	245819	7.1356	759 2	018-03	8-19 1	5:15:22	-0.0817	9 0.	00537	0.2779	98	0.00469	0.35	5977	0.00484	0.005189	8 1.5	753	39.32
14	24	458197.	1312153	2018-	03-19	9 15:08:57	245819	7.1364	050 2	018-03	3-19 1	5:16:25	-0.0676	L 0.	00568	0.3006	65	0.00499	0.36	5830	0.00506	0.005189	8 1.5	722	39.41
15	24	458197.	1319560	2018-	03-19	9 15:10:01	245819	7.1371	458 2	018-03	8-19 1	5:17:29	-0.0318	0.	00552	0.3413	36	0.00477	0.37	7317	0.00488	0.005189	7 1.5	690	39.51
16	24	458197.	1326852	2018-	03-19	9 15:11:04	245819	7.1378	749 2	018-03	3-19 1	5:18:32	-0.0184	B 0.	00555	0.3256	61	0.00487	0.34	1403	0.00499	0.005189	7 1.5	660	39.60
17	24	458197.	1334144	2018-	03-19	9 15:12:07	245819	7.1386	040 2	018-03	8-19 1	5:19:35	-0.0200	5 O.	00532	0.3308	86	0.00475	0.35	5090	0.00470	0.005189	7 1.5	630	39.69
	-													-											

其他功能介绍, Find variables 和 All stars photometry。要实现这两个功能上面步骤中本底、 暗流和平场的合并,目标图像本底、暗流和平场校正以及 Photometry 和 Matching 都需要 完成。

下面介绍下 Find variables

在完成上述步骤后,点击选项卡 Tools》Find variables,

🖕 SWSex - Muniwin	+	- 0	×
<u>P</u> roject <u>F</u> rames <u>R</u> educe P <u>l</u> ot <u>T</u> ools <u>H</u> elp			
📑 🤧 🖉 📲 🏪 📲 🌮 <u>F</u> ind variables	F 🛧 👄	V 🖊	>>
Frame # Date and time (UTC) Exp 📡 Make <u>c</u> atalog file			^
↔ 1 2018-03-19 14:54:12 4	g OK (100 % sta	rs matched)	
↔ 2 2018-03-19 14:56:24 5	g OK (77 % stars	matched)	
↔ 3 2018-03-19 14:57:26 5	g OK (74 % stars	matched)	
↔ 4 2018-03-19 14:58:29 5 <u>O</u> pen file	g OK (78 % stars	matched)	
⇔ 5 2018-03-19 14:59:32 5 Recent files	g OK (75 % stars	matched)	
↔ 6 2018-03-19 15:00:35 5	g OK (80 % stars	matched)	
↔ 7 2018-03-19 15:01:37 5	g OK (77 % stars	matched)	
↔ 8 2018-03-19 15:02:39 5 JD converter	g OK (81 % stars	matched)	
← 9 2018-03-19 15:03:41 5	g OK (83 % stars	matched)	
↔ 10 2018-03-19 15:04:45 5 😽 -	g OK (81 % stars	matched)	
E:\20180319\SW-Sex-S001-R032-C	a OK 180 % stars	(matched)	
粘胎 B Z H Z Edit profiles	😫 ↑_ ,	8.00.	
→ ◆ 格式刷 B I E Fivironment options		24.00.	
			-
🛧 SWSex - Muniwin	+	—	\times
<u>P</u> roject <u>F</u> rames <u>R</u> educe P <u>l</u> ot <u>T</u> ools <u>H</u> elp			
📑 💫 🗟 🖛 📬 🗕 🔍 🏂 🏂 🏑 🐼 B 🖡) F 🔶 득		×
ran 🏕 Find variables		×	
➡ Process		d)	
⊨ : ● all files in current project)	- 1
⊨ : ○ selected files only)	
₩ .)	
External file)	
⊨ Import data from an external file)	
Path:		Browse	
₩ €)	
)	
Help	Cancel)	
			1

选择需要处理的图像,点击 OK,出现如下界面,



左上角为其他星减去右上角图中 comparison star 后的星等差的标准差,标准差越大越有可能是变星。下面为选择标准差最大的星画出的星等差图,很明显是一颗变星。通过左键可以选择不同的星作为变星画图。左键点选右上角 Comparison star 中绿色小箭头后可以更换比较星。如果勾选 Ensemble photometry 后可以选择多颗比较星。在此界面下点击 File 选项 卡后出现多项可以保存的内容,如下图:

숶 Find variables - Muniwin									
<u>File View H</u> elp									
Save <u>m</u> ag-dev curve									
Save <u>c</u> hart									
Save <u>lig</u> ht curve									
Export varfind data									
Export mag-dev curve as image									
Export light curve as image									
Rebuild									
Close									

特别是 Export varfind data 可以将所有目标的仪器星等输出,可用于后续更加细致的变星寻找,输出后第一列为时间(JD),后面分别为从1号星到视场中最后一颗星(从亮到暗)的仪器星等以及测光误差,默认的测光孔径为1,具体怎样修改还不清楚。

关于 Find variables 的详细介绍可参考 Help 选项卡中 User's manual 中 Find variables。

下面介绍 All stars photometry

顾名思义,就是对视场中所有星进行测光,跟 Find variables 功能类似,但是可以直接得出 星等差并且能够调节测光孔径。

首先,完成所有上述步骤,之后点击 Plot light curve 选项卡,出现以下界面,勾选 Compute heliocentric correction 和 Compute air coefficient(根据自己需要),这时最关键的 是要勾选 Select all stars on the reference frame,然后点击 Apply。 $m{
u}$ Plot light curve

 \times

Process												
 all files in current project 												
⊖ selected files only												
Light curve options												
Compute heliocer	ntric correc	tion										
✓ Compute air mass coefficients												
Ensemble photon	Ensemble photometry											
Show raw instrum	Show raw instrumental magnitudes											
$\ensuremath{\boxdot}$ Select all stars on the reference frame												
Object - designation	SW-Sex		More									
- right ascension	10 15 09	[h m s]										
- declination	-3 08 33	[±d m s]										
Observatory - name	Xingming	Observatory	More									
- longitude 87 10 16 E [d m												
- latitude	[d m s N/S]											
<u>H</u> elp		<u>C</u> ancel	<u>A</u> pply									

出现以下图像,选择一颗星作为比较星。 A Choose stars



点击 ok 后选择测光孔径,

🛧 Choose aperture	×
Apertures	^
#1 (2.00)	
#2 (2.73)	
#3 (3.82)	
#4 (5.27)	
#5 (7.09)	
#6 (9.27)	
#7 (11.82)	
#8 (14.73)	

例如选3作为测光孔径后,出现以下图像



横坐标为时间(HJD),纵坐标为1号星减去 Comparison star 的星等差,可以通过点击 Y axis 后面的选项来决定显示哪颗星减 Comparison star 的图像,同时还可以修改测光孔径 Aperture。若想输出所有数据则需点击选项卡 View》Table,出现以下画面:

V Light curve - Muniwin		•• – 🗆 ×
<u>File E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> elp		
X axis JD V Heliocentric V Axis ID1-C V Selection New sele	tion Aperture #3 (3.82) 🗸	Zoom 🔍 🔍
FRAME # JD UTC Heliocentric JD Heliocentric UTC	ID1-C s1 ID2-C s2 ID3-C	s3 ID4-C s4 ID5-C s5 ID6-C s6 ID7-C s7 ID5
1 2458197.1209722 2018-03-19 14:54:12 2458197.1261624 2018-03-19 15:01	40 -1.05445 0.00221 -0.68052 0.00234 -0.489	358 0.00242 -0.38339 0.00249 -0.37658 0.00248 -0.34359 0.00250 -0.19925 0.00258 0.1
2 2458197.1225000 2018-03-19 14:56:24 2458197.1276901 2018-03-19 15:03	52 -1.09555 0.00222 -0.68612 0.00237 -0.501	175 0.00244 -0.38873 0.00252 -0.40619 0.00249 -0.34944 0.00253 -0.21039 0.00262 0.0
3 2458197.1232176 2018-03-19 14:57:26 2458197.1284076 2018-03-19 15:04	54 -1.07881 0.00222 -0.67751 0.00236 -0.482	205 0.00244 -0.36369 0.00253 -0.38899 0.00250 -0.33981 0.00253 -0.16343 0.00264 0.1
4 2458197.1239468 2018-03-19 14:58:29 2458197.1291368 2018-03-19 15:05	57 -1.06321 0.00223 -0.69205 0.00236 -0.536	i04 0.00242 -0.41544 0.00250 -0.41849 0.00248 -0.38912 0.00250 -0.25481 0.00257 0.C
5 2458197.1246759 2018-03-19 14:59:32 2458197.1298659 2018-03-19 15:07	00 -1.07430 0.00204 -0.68495 0.00217 -0.481	97 0.00224 -0.37227 0.00230 -0.40705 0.00228 -0.32719 0.00234 -0.20340 0.00238 0.(
6 2458197.1254051 2018-03-19 15:00:35 2458197.1305951 2018-03-19 15:08	03 -1.06299 0.00208 -0.68515 0.00220 -0.472	271 0.00228 -0.36046 0.00235 -0.40097 0.00231 -0.33131 0.00236 -0.15464 0.00245 0.1
7 2458197.1261227 2018-03-19 15:01:37 2458197.1313126 2018-03-19 15:09	05 -1.06696 0.00206 -0.68696 0.00219 -0.487	/19 0.00226 -0.37394 0.00233 -0.42012 0.00229 -0.33820 0.00233 -0.19074 0.00241 0.0
8 2458197.1268403 2018-03-19 15:02:39 2458197.1320302 2018-03-19 15:10	07 -1.08286 0.00204 -0.67346 0.00217 -0.511	173 0.00223 -0.39235 0.00230 -0.40188 0.00228 -0.36393 0.00230 -0.21404 0.00239 0.0
9 2458197.1275579 2018-03-19 15:03:41 2458197.1327478 2018-03-19 15:11	090.69623 0.00208 -0.495	31 0.00216 -0.39126 0.00221 -0.39707 0.00220 -0.35231 0.00222 -0.19628 0.00231 0.0
10 2458197.1282986 2018-03-19 15:04:45 2458197.1334885 2018-03-19 15:12	130.65571 0.00236 -0.514	402 0.00241 -0.41022 0.00248 -0.33733 0.00251 -0.34888 0.00252 -0.22743 0.00258 0.1
11 2458197.1290278 2018-03-19 15:05:48 2458197.1342176 2018-03-19 15:13	160.68303 0.00203 -0.487	/82 0.00210 -0.38332 0.00215 -0.38235 0.00214 -0.33244 0.00218 -0.19668 0.00224 0.1
12 2458197.1297569 2018-03-19 15:06:51 2458197.1349468 2018-03-19 15:14	190.491	159 0.00206 -0.38323 0.00211 -0.38715 0.00211 -0.34850 0.00212 -0.20095 0.00218 0.1
13 2458197.1304861 2018-03-19 15:07:54 2458197.1356759 2018-03-19 15:15	220.68313 0.00201 -0.491	168 0.00208 -0.38878 0.00213 -0.38252 0.00213 -0.34315 0.00215 -0.20171 0.00221 0.1
14 2458197.1312153 2018-03-19 15:08:57 2458197.1364050 2018-03-19 15:16	250.70519 0.00209 -0.496	j21 0.00216 -0.40178 0.00222 -0.41737 0.00220 -0.34544 0.00224 -0.21193 0.00230 0.1
15 2458197.1319560 2018-03-19 15:10:01 2458197.1371458 2018-03-19 15:17	290.68236 0.00201 -0.475	j98 0.00209 -0.36256 0.00215 -0.37906 0.00213 -0.34116 0.00216 -0.17074 0.00223 0.1
16 2458197.1326852 2018-03-19 15:11:04 2458197.1378749 2018-03-19 15:18	32 -1.03079 0.00198 -0.66787 0.00209 -0.507	/30 0.00216 -0.41120 0.00221 -0.37574 0.00221 -0.35188 0.00223 -0.22290 0.00229 0.1
17 2458197.1334144 2018-03-19 15:12:07 2458197.1386040 2018-03-19 15:19	350.68227 0.00200 -0.481	J92 0.00208 -0.37582 0.00213 -0.38293 0.00212 -0.33734 0.00214 -0.19038 0.00221 0.1
18 2458197.1341435 2018-03-19 15:13:10 2458197.1393332 2018-03-19 15:20	380.68157 0.00202 -0.498	358 0.00208 -0.39397 0.00213 -0.38963 0.00213 -0.35291 0.00215 -0.21110 0.00221 0.1
19 2458197.1348727 2018-03-19 15:14:13 2458197.1400623 2018-03-19 15:21	410.68439 0.00201 -0.492	214 0.00208 -0.39190 0.00213 -0.38766 0.00213 -0.34271 0.00215 -0.19909 0.00222 0.1
20 2458197.1356134 2018-03-19 15:15:17 2458197.1408030 2018-03-19 15:22	450.68192 0.00200 -0.485	i90 0.00207 -0.37897 0.00212 -0.38359 0.00212 -0.34963 0.00213 -0.19289 0.00220 0.1
21 2458197.1363426 2018-03-19 15:16:20 2458197.1415322 2018-03-19 15:23	480.68155 0.00204 -0.491	166 0.00211 -0.38812 0.00216 -0.38141 0.00216 -0.34743 0.00217 -0.19660 0.00224 0.1
22 2458197.1370718 2018-03-19 15:17:23 2458197.1422613 2018-03-19 15:24	51 -1.05890 0.00193 -0.67859 0.00205 -0.486	398 0.00212 -0.38431 0.00218 -0.38004 0.00216 -0.34031 0.00219 -0.19624 0.00226 0.1
23 2458197.1378009 2018-03-19 15:18:26 2458197.1429905 2018-03-19 15:25	540.68164 0.00199 -0.500	33 0.00206 -0.40195 0.00210 -0.38599 0.00211 -0.34957 0.00213 -0.20882 0.00219 0.1
24 2458197.1385301 2018-03-19 15:19:29 2458197.1437196 2018-03-19 15:26	570.486	386 0.00207 -0.38454 0.00212 -0.38682 0.00212 -0.34471 0.00214 -0.19769 0.00220 0.1
25 2458197.1392824 2018-03-19 15:20:34 2458197.1444719 2018-03-19 15:28	020.491	155 0.00209 -0.38721 0.00213 -0.38640 0.00214 -0.34455 0.00215 -0.19823 0.00223 0.1

点击选项卡 File》Save 可将数据保存,至此 All stars photometry 完成。

PS:现在存在一个问题,不知道视场中哪颗星是1号星,哪颗星是2号星,等等。可以回 到以下界面:

🕂 SWS	Sex - Muniwin			↔ _ [
<u>P</u> roject	<u>F</u> rames <u>R</u> educe	P <u>l</u> ot <u>T</u> ools <u>H</u> elp			
📑 🍯	¥ /• -+ ∦	* 🔎 📑	: 💈 🗸 🥝	🖻 B 🖸 F 🚖 👄 🗸	& »
Frame #	Date and time (UTC)	Exposure Filter Sta	ars found Stars n	natched Status	^
⇔ 1	2018-03-19 14:54:12	40.000 N	233	233 Matching OK (100 % stars match	ed)
⇔ 2	2018-03-19 14:56:24	50.000 N	158	122 Matching OK (77 % stars matched	d)
⇔ 3	2018-03-19 14:57:26	50.000 N	162	120 Matching OK (74 % stars matched	d)

左键双击 Frame 1,出现以下图像:

Q Frame #1 - Muniwin

<u>Frame View Tools Help</u>



点击选项卡 View》table,出现以下画面:

🔍 Frame #1 - Muniwin

<u>Frame View Tools H</u>elp

Frame	4	1/96	-	Zoom	Q	ર ભ		Aperture	#1 (2.00)	\sim				
Obj. # F	lef. #	х	Y	FWHM [px	l] Sky	[ADU]	Sky	y dev. [ADU] Net inte	nsity [ADU]	Noise [ADU]	S/N ratio [dB]	Brightness [mag]	Error [mag] Status
1	1	408.34	873.41	3.0	1 15	528.91		31.07	,	408008.5	482.9	29.3	10.9733	0.0013
2	2	549.27	648.70	2.9	4 15	540.08		31.92	2	291490.1	413.2	28.5	11.3384	0.0015
3	3	449.37	114.34	2.8	5 15	540.10		30.31		249464.4	383.2	28.1	11.5075	0.0017
4	4	498.35	48.19	2.8	9 15	546.03		33.80)	223482.3	368.1	27.8	11.6269	0.0018
5	5	971.57	677.21	2.9	4 15	537.17		31.22	2	217491.3	360.7	27.8	11.6564	0.0018
6	6	426.15	409.64	2.9	5 15	540.62		31.91		214536.6	359.2	27.8	11.6712	0.0018
7	7	507.76	9.19	2.8	4 15	545.14		29.54	Ļ	190153.7	337.9	27.5	11.8022	0.0019
8	8	295.30	504.63	2.9	5 15	536.55		29.71		155691.9	309.2	27.0	12.0193	0.0022

第一列标号就是 1、2、3.....号星的的序号,X和Y即为它们的坐标,如果图像已经加了 WCS 信息还会显示它们的赤经赤纬。点击选显卡 Frame》Export 可将所有数据输出。

如有问题可与我联系: 李凯 <u>kaili@sdu.edu.cn</u> 完成于 2018 年 5 月 6 日