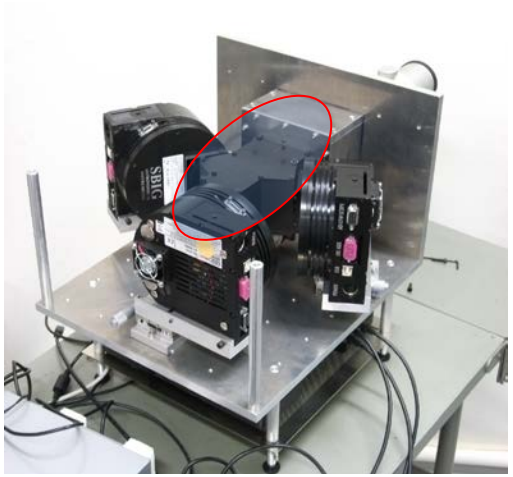
TRIPOL:3色(*g*’ *r*’ *i*’)撮像偏光装置の性能

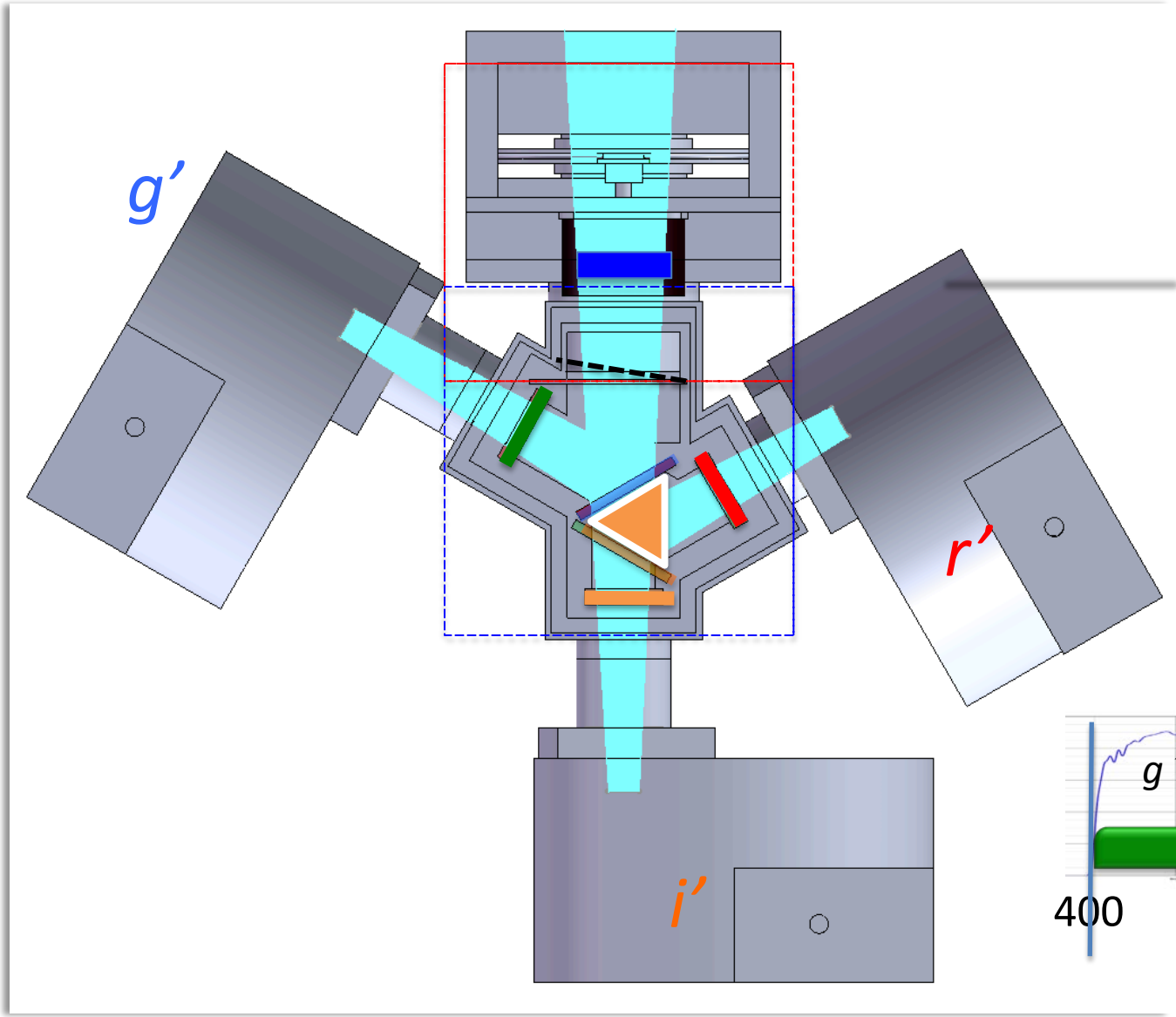
佐藤修二 (名大理)　　永山貴宏、禅野孝広、河合利秀

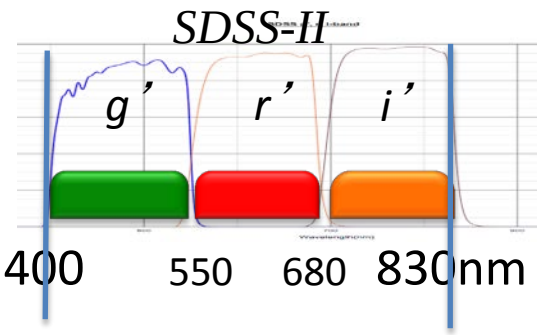
Triple Range Imager and POLarimeter

単純ー軽快

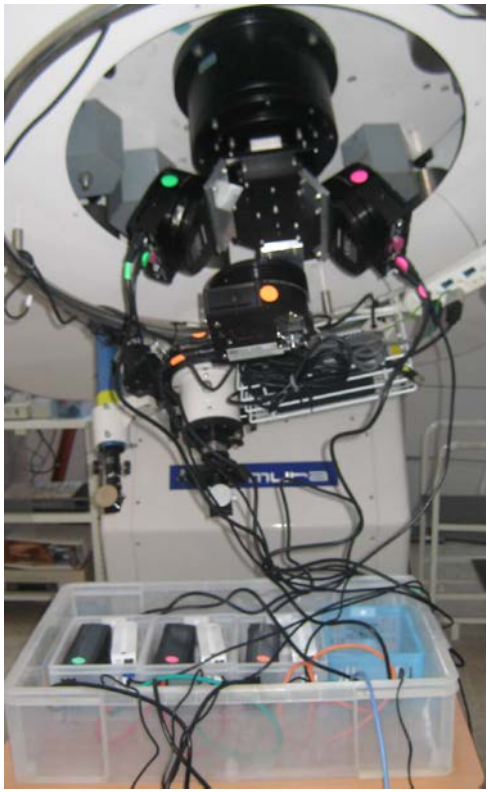
仕様　◎限界等級　　15 mag: @*r*’ ⊿T~60s　[S/N]~3　1m 望遠鏡
　　◎測光安定性　0.01mag/hour rms
　　◎偏光精度　　＜0.3%



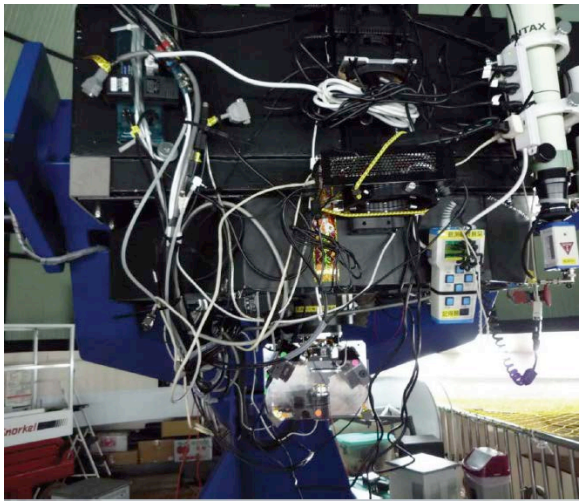

g′
r′
i′


SDSS-II
g′
r′
i′
400
550
680
830nm

TRIPOL-I の評価　2011



2011/01~02
岐阜・安八
70cm望遠鏡



2011/08
台湾・鹿林
1m望遠鏡

2011/10
南アフリカ
75cm望遠鏡

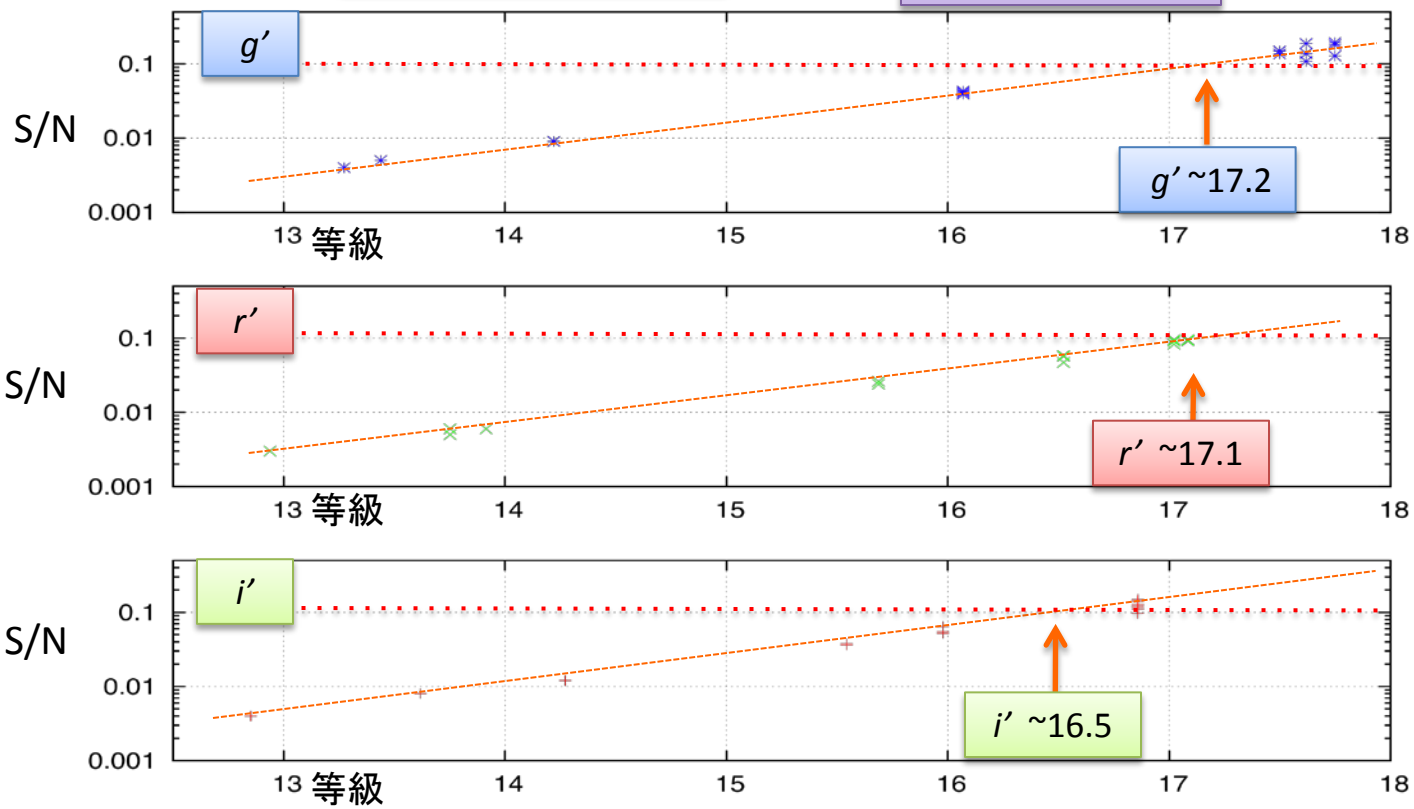
*TRIPOL*の評価

- 測光（撮像）

  限界等級

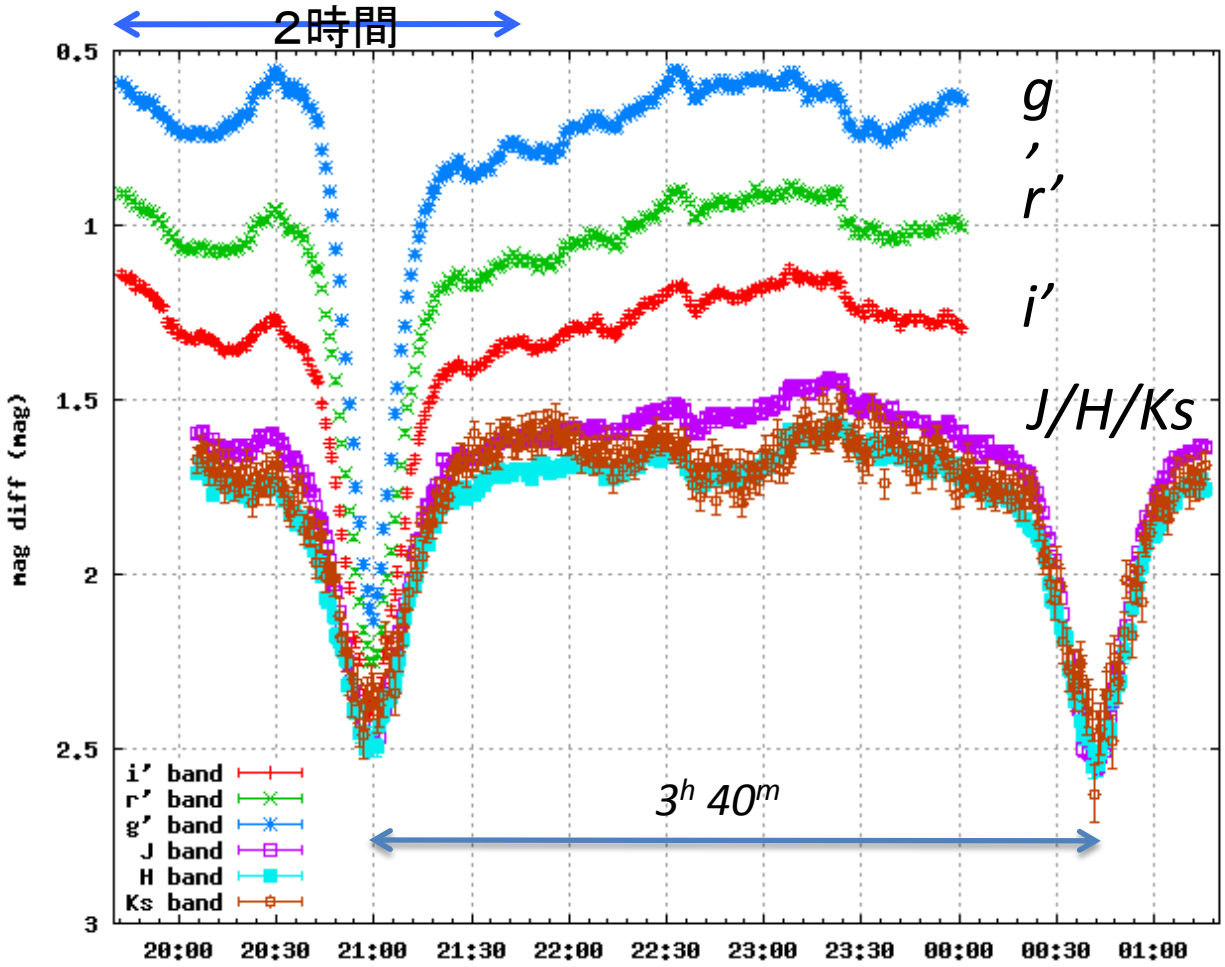
SAAO75cm望遠鏡
[S/N~10] 60sec
Field = MCT2019

g’ ~17.2 等
r’ ~17.1 等
i’ ~16.5 等



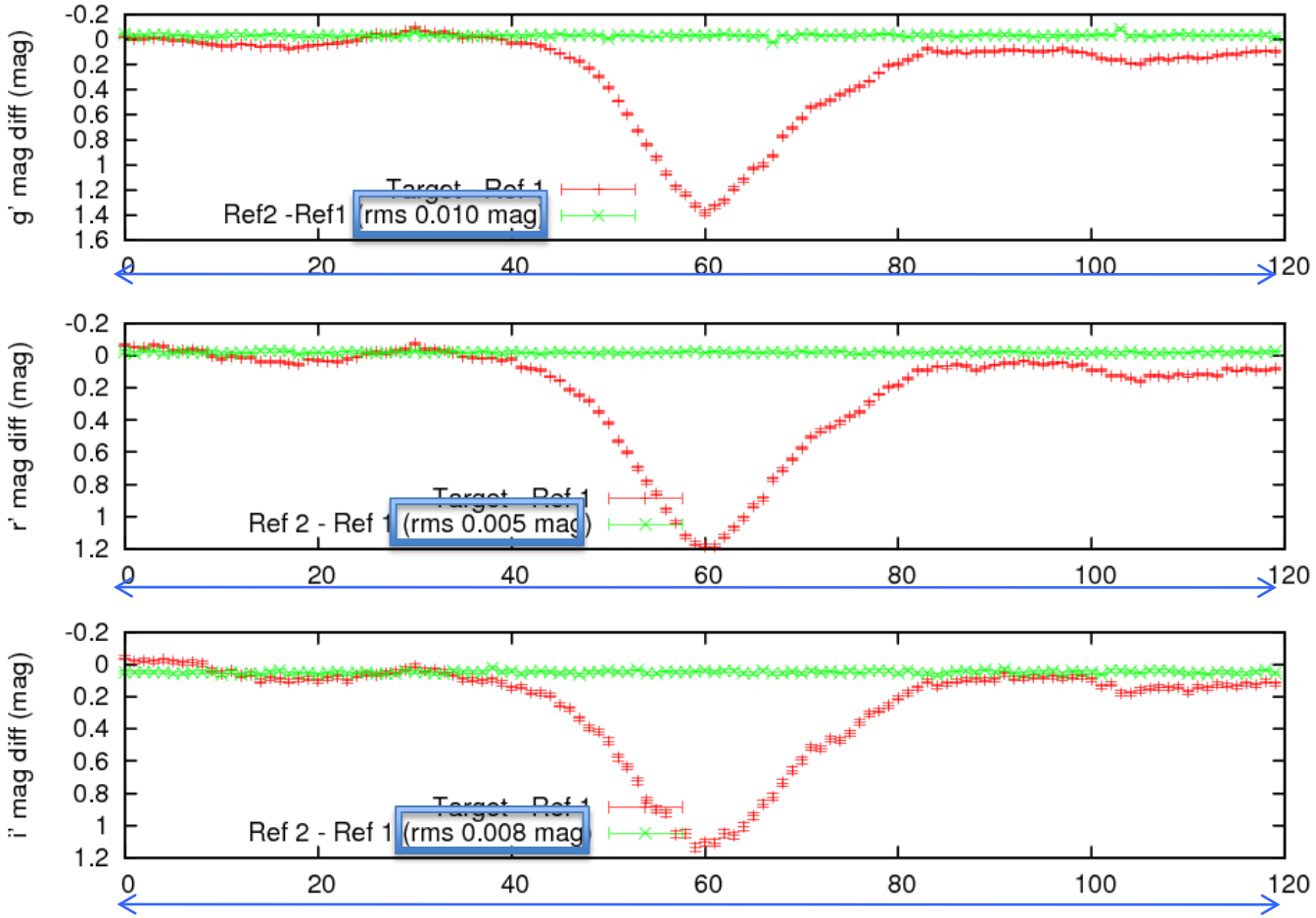
Simultaneous Six-color photometry of EC2117

with TRIPOL on SAAO 75cm + *SIRIUS* on IRSF 1.4m



安定性 - 長時間（～2時間）

+++ $R_2 - R_1$　+++ $R_* - R_1$



2時間

偏光キャリブレーション
鹿林天文台　1m望遠鏡

------- I. ゼロ偏光標準星 ----------

	P(V)	g’	r’	i’
HD 212311	0.034%	q/u=>P±ΔP θ±Δθ	q/u=>P±ΔP θ±Δθ	q/u=>P±ΔP θ±Δθ
BD+32373	--.----%	P±ΔP θ±Δθ	P±ΔP θ±Δθ	P±ΔP θ±Δθ
BD+28421	0.054%	0.3±0.2%	0.4±0.2%	0.3±0.2%

平均

＜0.2%

“instrumental”　~10 秒積分

- --------II. 強い偏光標準星 ----------

	g’		r’		i’	
1) Hiltner 960	5.82±0.21%	53°	5.38±0.11%	**°	4.49±0.14%	52°
	5.663%	55°	5.210%	55°	4.55%	54°
2) HD155197	4.18±0.08%	102°	4.38±0.04%	102°	3.69±0.03%	104°
	4.320%	103°	4.274%	103°	3.906%	103°
3) VI Cyg#12	9.46±0.05%		8.98±0.06%		7.88±0.05%	
4) HD204827	4.2 %	102°	4.4 %	103°	3.9%	103°

Schmidt et al’s. data (1992) at V, R, and I-bands,

	V		R		I	
• Hiltner 960	5.663%	55°	5.210%	55°	4.55%	54°
• HD 155197	4.320%	103°	4.274%	103°	3.906%	103°

まとめ

方向 θ ⇔ 焦点f: θ =>(x:y)

撮像

Spectrum 分光 λ ⇔ 色-分解

“band”

多層膜干渉

3色

偏光 σ ⇔ [複屈折＋格子]

偏光

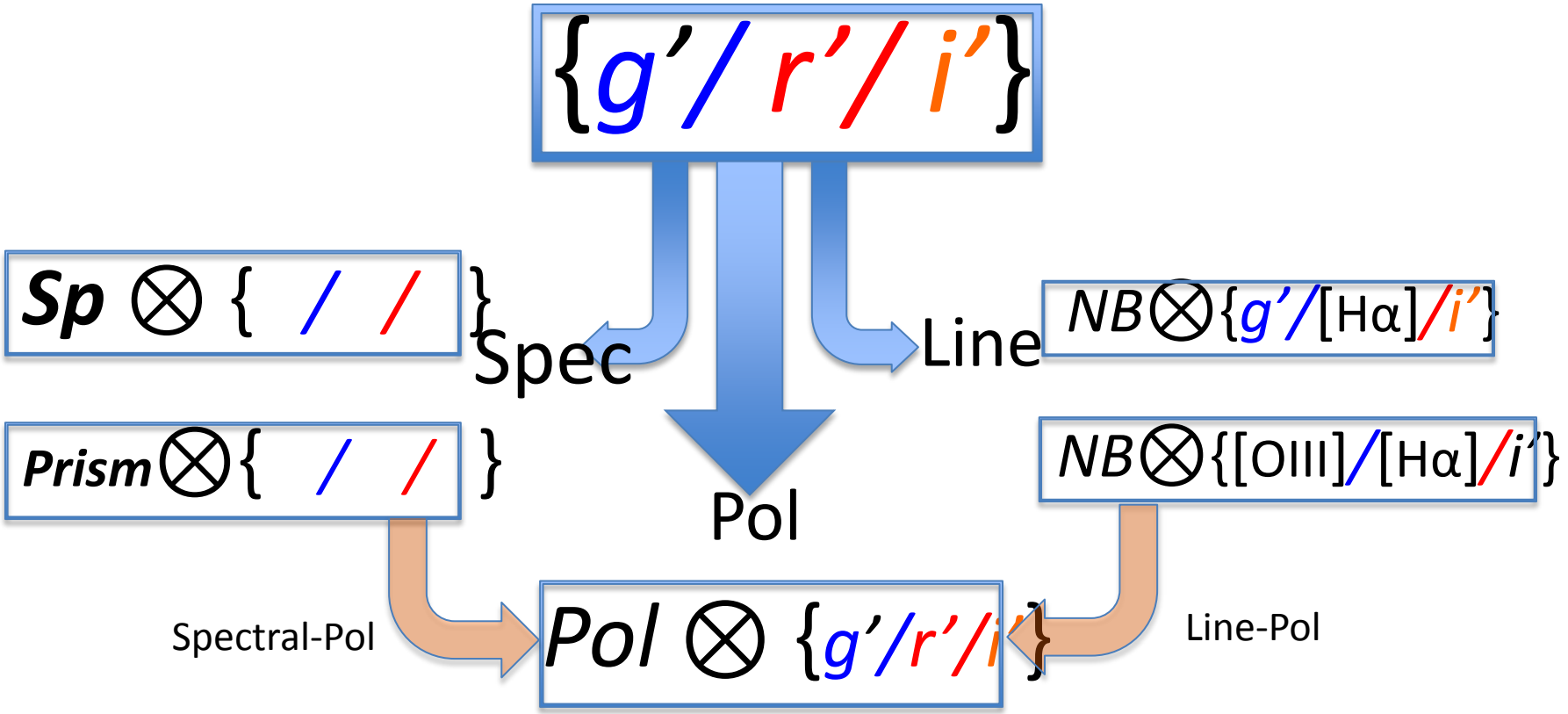
3色撮像偏光装置：*TRIPOL*

性能 （限界等級、測光安定性、偏光精度）

17.1 mag <0.01mag <0.2%

仕様を満たす

TRIPOL の発展


{g'/ r'/ i'}
Sp ⊗ { / / }
Spec
Line
NB⊗{g'/[Hα]/i'}
Prism⊗{ / / }
Pol
NB⊗{[OIII]/[Hα]/i'}
Spectral-Pol
Pol ⊗ {g'/r'/i'}
Line-Pol

偏光標準星　キャリブレーション

- 偏光

台湾　鹿林天文台　1m望遠鏡

強い偏光標準星　Hiltner 960
VI Cyg #12
HD204827
HD155197

ゼロ偏光標準星　HD212311
BD+28_421
BD+32_373

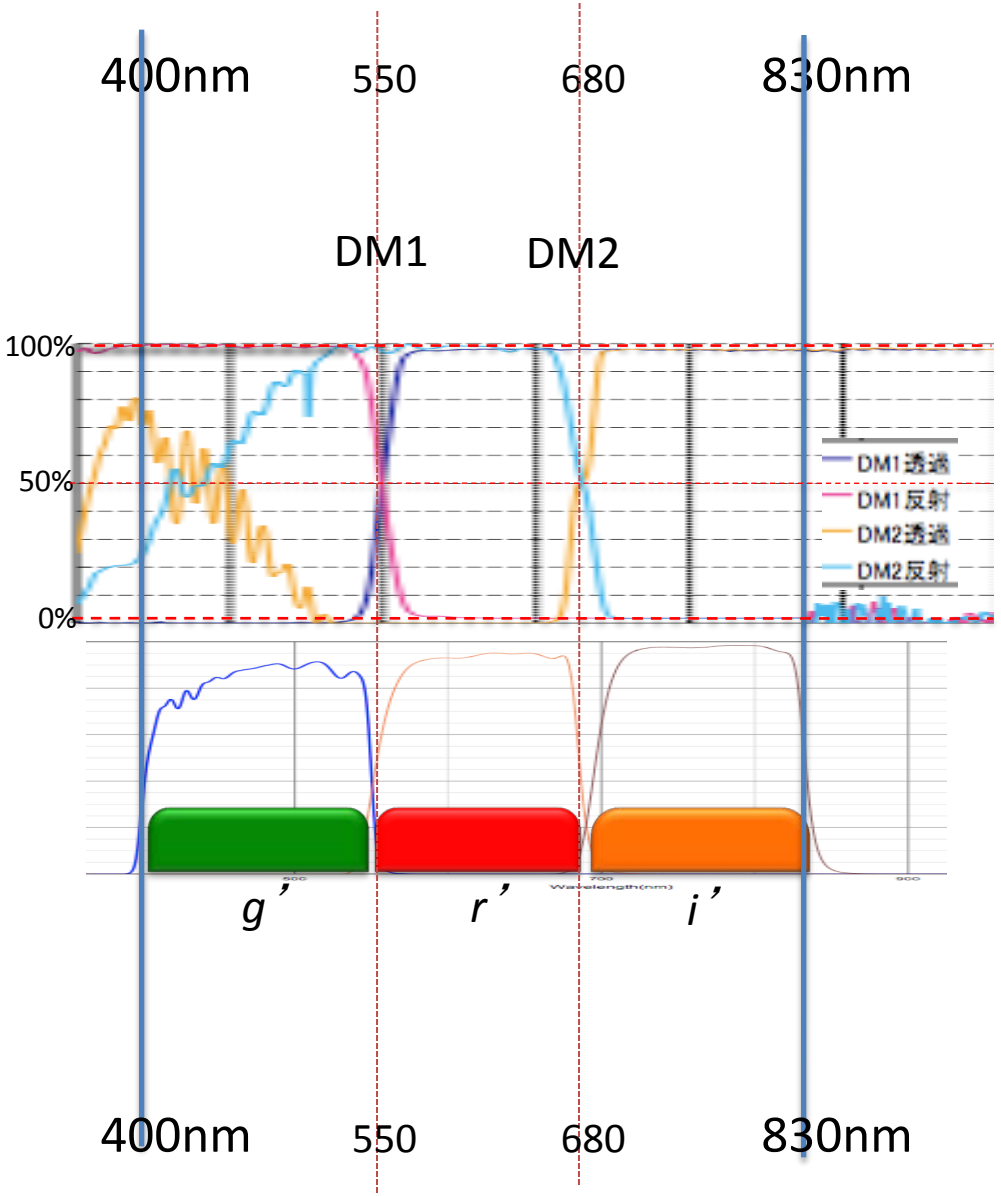
CCD　SBIG　ST-9 Xei

20μm/pixel　　512x512素子

分解能：0.4”　視野　3.4’ 口径1m：F10

③Dichroic mirrors
Transmission
/Relection

④Bandpass filters
Transmission



	Pg'	*Pr'*	*Pi'*	*2011.*
V374 Cep	4.79±0.04% (77°)	4.87±0.03% (81°)	4.72±0.05% (74°)	8.17
BD+55 2693	2.63±0.04% (-9°)	2.29±0	.15±0.11% (-2°)	8.17
V1578 Cyg	0.67±0.05% (-1°		.38±0.10% (7°)	8.17
BD+56 2626	2.35±0.02% (-33°	)	2.70±0.02% (-26°)	8.17
BD+56 563	3.89±0.01% (66°	±0.01% (69°)	3.24±0.05% (74°)	8.17
V2028 Cyg	3.16±0.09% (3°)	2.85±0.04% (*°)	1.98±0.05% (11°)	8.17
T Tau	0.70±0.14% (22°)	0.63±0.06	.06% (37°)	8.17
DG Tau	5.90±0.34% (17°	)	14% (-84°)	8.17
GM Cep	5.61±0.19% (1		±0.10% (28°)	8.17
HL Tau	13.10±0.32% (8	(85°)	13.40±0.16% (*°)	8.17
PDS 581	14.01±0.26% (-4°)	15.28±0	±0.27% (0°)	8.17
BL Lac	9.02±0.13% (-23°)	7.77±0.04% (-19°)	15°)	8.14 - 8.18
	11.93±0.59% (-45°)	10.60±0.25% (-42°)	(-37°)	

Be Stars

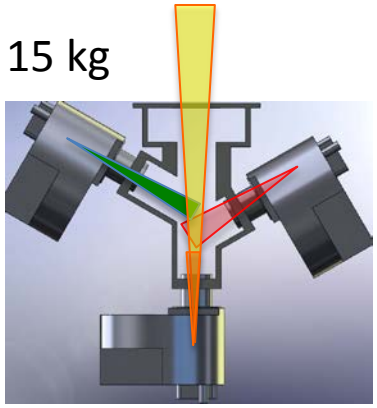
T Tauri Stars

Post AGB

Blazar

TRIPOL

15 kg

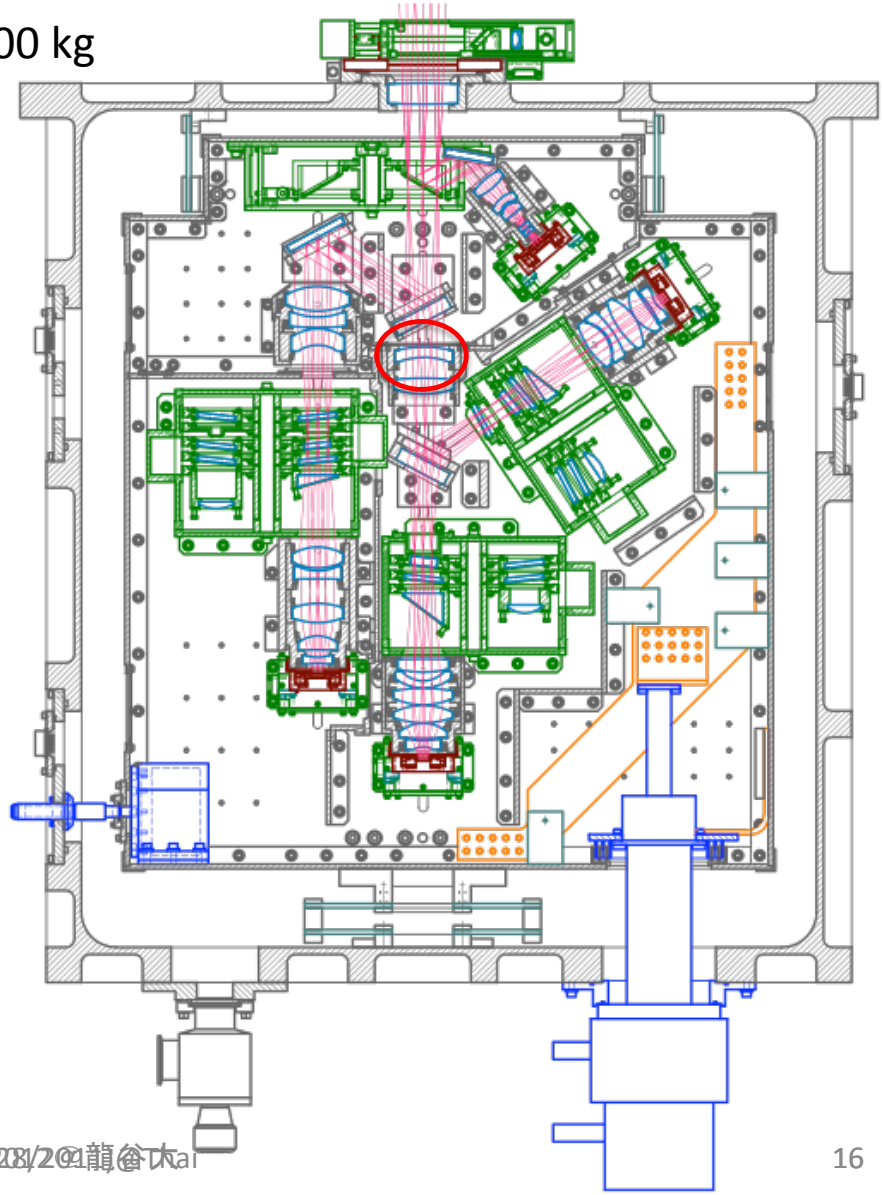


34 cm

~10 cm

TRISPEC

500 kg



1m