

PFSとWF MOSのちがい 仕様への要望のまとめ

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WFMOS vs PFS

- ▶ WFMOS はどうだったのか？
 - ▶ 2009年時点で、WFMOSを進めることについて、(一応)コミュニティの合意は取れていた。
 - ▶ ちょっと復習



光天連シンポジウム

光天連シンポジウム(2008/8/21-22)では、

- これまでの経緯をまずコミュニティへ説明
 - 期待されるサイエンスのトピックス、
 - WFMOSについての懸念
- などが示された。

最後に、挙手による意見分布を求めたところ、WFMOSの
渉を進めることに肯定的・中立的意見がほぼ半々となった。

⇒交渉を進めることとした

WFMOS Shock

- 2009/1のすばるUMでも進めることは合意
- NAOJ-Geminiの合意書取りまとめは最終段階であった

2009/6 (Subaru-Gemini Kyoto Conference直前)
突如キャンセル



NAOJ/Gemini WFMOS Agreement Draft

(Ver. 3.16/Apr. 2009)

- ▶ **(Responsibilities of Gemini)** Gemini will design and construct the Gemini Provided Elements (GPE).
 - ▶ WFMOS shall meet the requirements of a prime focus instrument of Subaru telescope.
 - ▶ Gemini will cooperate with Subaru to install the GPE at Subaru and provide the technical support and labor needed to prepare WFMOS for Final Acceptance.
 - ▶ Final Acceptance testing shall be done by Gemini with cooperation from Subaru.
- ▶ **(Responsibilities of Subaru)** Subaru shall design and construct the Subaru Provided Elements (SPE) and accept WFMOS as a Subaru facility instrument upon its completion.
 - ▶ Subaru will provide telescope nights for testing and commissioning of WFMOS.
 - ▶ Subaru will provide the routine operations and maintenance of WFMOS.
- ▶ Subaru shall provide Gemini with the technical support and information necessary for completion of WFMOS as a Subaru

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- ▶ **(Joint Science Campaigns - JSC)** Three hundred nights of WFMOS observing time will be allocated for one or more JSC.
 - ▶ The JSC nights will be assigned over a 5 year period.
 - ▶ Additional nights may be added to the JSC later if both parties agree to do so.
 - ▶ Each JSC team shall be a unified team with an approximately equal number of both Japanese and Gemini scientists.
 - ▶ Gemini will provide Subaru with $\frac{1}{2}$ night of Subaru Exchange Time on Gemini for each allocated JSC night.
 - ▶ **(PI Programs)** WFMOS will be open to both the Subaru and Gemini communities as an open-use instrument.
 - ▶ Gemini PI time on WFMOS will be based on the framework of the Subaru-Gemini Time Exchange Program.
 - ▶ The number of PI nights offered for use on WFMOS shall be equal for both the Gemini and Subaru communities and shall be at least 10 nights per year, and shall not exceed the number of nights allocated for the Subaru-Gemini Exchange Program. The number of nights allocated for the Subaru-Gemini Exchange Program (that includes WFMOS and other Subaru facility instruments) may be determined each semester by mutual agreement among Subaru SAC, Subaru director, Gemini director, and ???, and shall be at least 5 nights per semester.
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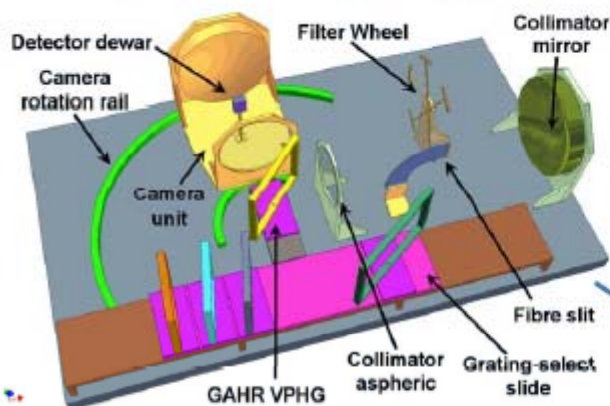
WF MOS: the Wide-field Fiber Multi-Object Spectrometer

A joint project of the Subaru Telescope and Gemini Observatory

Key science proposed for WF MOS:

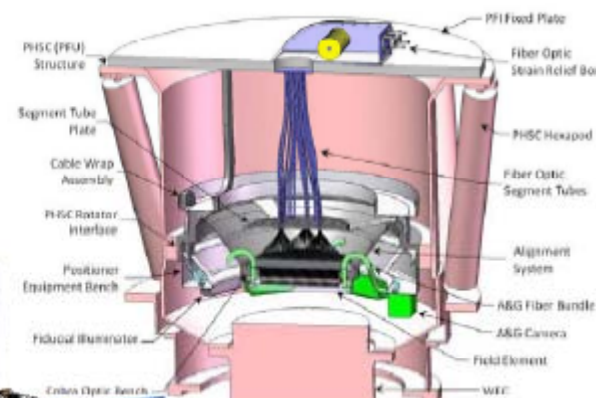
- Dark Energy—measure $w(z)$ to 3% using baryon acoustic oscillations; redshifts to 4×10^6 galaxies
- Formation of the Milky Way: dynamics of 3×10^6 stars and Chemical Tagging of another 10^6 stars in the Galaxy
- Galaxy evolution and growth of structure in the universe
- Highly complementary with HyperSuprime Cam science

The proposed WF MOS Concept



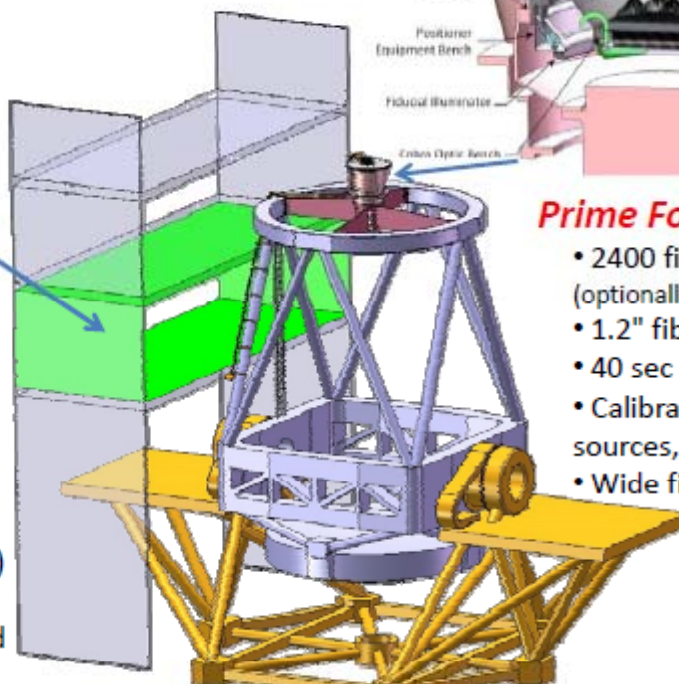
Three identical spectrographs:

- Optimized for high efficiency 0.4 to 1 μm
- $R=1500$, 3500, or 5000 (2400 objects)
- $R=20,000$ (600 or more simultaneous objects)
- Fully reconfigurable during observing
- Additional gratings/resolutions may be added



Prime Focus instrument:

- 2400 fiber positioners (optionally expandable to 3200)
- 1.2" fibers, 1.3° FOV
- 40 sec reconfig. time
- Calibration and alignment sources, guide fibers
- Wide field corrector



WF MOS vs. PFS

	WF MOS	PFS
Main Contractor	Gemini	PFS collaborators
Management	JPL	IPMU+NAOJ (?)
Cost Est.	\$75M (incl. reserve)+Subaru Upgrade	\$34M+\$7.4M reserve
Survey Nights	300 Nights	150~300 Nights (?)
	150 Nights will be compensated by Gemini time	No compensation
Spectrograph	R=1500–5000	R=2000–5000 (fixed)
	0.4-1.0 μm	0.38-1.3 μm
	Challenging Design	Three-arm Design, less challenging than WF MOS
Fiber Positioner	2400 Fibers	2400 Fibers
	R=20000 Hi-res 600 Fibers	(Future Option : 200 Fibers ?)

WF MOS vs PFS

- ▶ PFSはWF MOSに比べて
 - ▶ DE survey / Galaxy Evolutionに特化している
 - ▶ 組織はより複雑に
 - ▶ プロジェクトのマネジメント
 - ▶ 利害調整
 - ▶ 日本側がどっぷりとマネージメントをしないといけない
 - ▶ Geminiによるサーベイ時間のcompensation がない

**すばるコミュニティへのインパクトはより大きい。
チャンスに転化できるか？**



Summary: Science requirements on PFS

Science	Scientific objectives	Key requirements	Minimum nights	The need of IR	Synergy
Cosmology	DE, neutrinos	# of fibers + thpt	>40 nights (2000deg ²)	wider z-range (up to higher z' s)	HSC
GA	DM, the origin of MW	Wide λ -coverage (390 - 600nm)	90 nights	NA	GAIA, TMT HSC-wide
Dusty galaxies	Galaxy evolution	# of fibers (~500 per deg ²)	Follow-up obs.	Yes	HSC, Herschel, AKARI, SPICA
Galaxies at $z < 2$	Galaxy evolution	NIR arm	~80 nights	Essential to study galaxies over $0.5 < z < 2$	HSC-deep
Galaxies at $z > 2$	Reionization, galaxy evol.	Thpt (20%)	~60 nights	Wider z-coverage. [OII] systemic vel. for $z \sim 2$ gals	HSC, LOFAR, TMT, ALMA, JWST, SKA
QSO/AGN	Reionization, BHs	High thpt at $>6000\text{\AA}$	45 nights	Yes (metal lines)	HSC, TMT, ALMA
Ly- α	DE,	Thpt + low	TBA	NA	HSC

PFSで得られるものは？

- ▶ 次世代の装置
- ▶ 大型国際共同プロジェクトの経験
- ▶ IPMUに光赤外装置グループ
- ▶ 若手の育成(を積極的に考えてないと)
- ▶ 国内技術の蓄積

失うものと見比べて、
コミュニティの10年先を見据えて
良く考えてほしい。



