Summary of time-domain session

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On behalf of time-domain ISDT and session participants

Summary: plan for white paper

Input to the planned instruments

- Realize Δt ~1 sec time resolution
- Simultaneous Opt+NIR wavelength coverage (R ~ 1000 - 5000+)
- Requirements to operation
 - Inter-partner ToO (ToO policy)
 - Queue/dynamic scheduling
 - Monitoring program
- New instrument concept (OCTOCAM-type)
 - Simultaneous Opt+NIR spectrophotometry + polarimetry with Δt ~ 50 ms time resolution

Time-domain science



Science beyond DSC2015



Astrophysics of compact objects and accretion

High Speed Astronomy

= Observations with high time-resolutions

Compact object	Binary	Dynamical Time-scale	
White dwarf (WD)	Cataclysmic variables (CVs)	1-10 SEC	
Neutron star (NS)	V ray hinarias (VRs)	10 ⁻³ sec	
Black hole (BH)	A-ray binaries (ADS)		

• <u>Structure of objects using tomography</u>

- Binaries, small solar system bodies, etc.
- Spatial resolution (Δx) = Time resolution (Δt)
 - Case for Doppler tomography: Spectral resolution $R \sim (\frac{c}{\Omega})(\Delta x)^{-1}$

Time resolution $\Delta t \sim V \Delta x$

(Marsh 2008)

Slide from Makoto Uemura



Phase diagram for "high-speed" astronomy



if 1 sec time resolution is realized with WFOS+IRIS

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Science that cannot be achieved with planned instruments

- Δt < 1 sec time resolution
 - Compact objects
 - Accretion disks in compact binaries
- Opt + NIR spectrophotometry within Δt ~< 5 min (Not enough time to switch instruments)
 - GRB afterglow
 - Transit spectroscopy of exoplanets
- Polarimetry
 - Supernovae and novae (multi-D structure)
 - GRBs (magnetic fields)

Gemini/OCTOCAM Opt + NIR spectral coverage with 50 msec resolution

Pete Roming (Project Manager)



- grizYHJK simultaneous imaging
 - neous imaging
- Spectroscopy (0.37-2.35 um, R ~ 4,000)
- 3' x 3' FOV (Opt: frame transfer CCD, NIR: H2RG)
- IFU/polarimetry option
- Expected commissioning run 2021-

Slide from Pete Roming

http://www.gemini.edu/node/12656

Prioritization of Capabilities

	- The Alle	< 1 sec	and the second	The second second	
Science Topic	Multi- band Imaging	Time Resolu- tion	Multi- wavel. Spectr.	Spectro polari- metry	IFU Spectr.
Trans-Neptunian Objects	5	3	4	1	2
Extrasolar Planets	3	2	5	1	2
Asteroseismology	5	3	4	3	1
Massive Stars	5	3	5	3	5
Brown Dwarfs	5	5	4	1	1
Low-Mass Binaries	5	5	4	1	1
Low-Metallicity Stars	4	1	5	1	1
Isolated Neutron Stars	5	5	3	4	3
Magnetars	5	5	3	4	1
Interacting Binaries	5	5	4	3	2
Millisecond Pulsar Binaries	5	5	3	2	1
X-Ray Binaries	5	5	4	1	1
Supernovae	5	1	5	4	4
Supernova Remnants	5	1	5	2	3
Gamma-Ray Bursts	5	2	5	2	4
Active Galactic Nuclei	5	1	5	3	2
Tidal Disruption Events	5	3	5	2	1
Galaxy Clusters	5	2	4	1	4

1 (not Important) to 5 (extremely important)

Slide from Pete Roming

8-November-2017

TMT Science Forum – Mysore, India

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Feedback from you is welcome