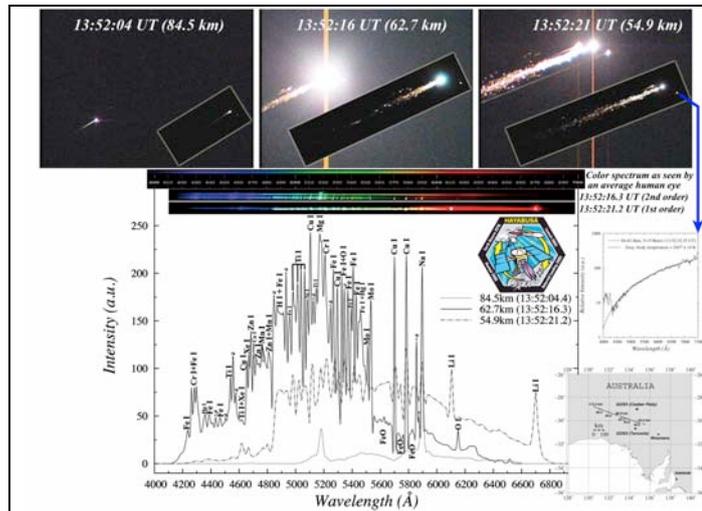


## 研究課題名 近地球型小惑星の起源と進化

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利用カテゴリ 汎用PC

- (1) HAYABUSA is the first spacecraft ever to land on and lift off from any celestial body other than the moon and returning asteroid samples to the Earth while overcoming various troubles. The mission ended on June 13, 2010, with the planned atmospheric re-entry. I observed the HAYABUSA using imaging and spectroscopic cameras in 2010. Synthetic molecular spectra were carried out using the SPRADIAN numerical code (Fujita & Abe 1997) to examine physical conditions such as temperature, density and abundances in the gaseous plasma. Vibration and rotation temperatures as well as column density were parameters to simulate synthetic spectra using CfCA computer facility. A strong shock layer of HAYABUSA spacecraft was rapidly formed at heights between 93 km and 83 km which was confirmed by a detection of  $N_2^+(1-)$  bands with a vibration temperature of  $\sim 13000$  K. Synthetic spectrum was carried out in part on the general-purpose PC farm at the Center for Computational Astrophysics (CfCA) of NAOJ. A paper (S. Abe, K. Fujita, Y. Kakinami, O. Iiyama et al. “Near-Ultraviolet and Visible Spectroscopy of HAYABUSA Spacecraft Re-Entry”) was published in *PASJ* 63, 1011-1021, 2011.



- (2) The Panoramic Survey Telescope And Rapid Response System “Pan-STARRS” is a project, initiated by the Institute for Astronomy (IfA) University of Hawaii, to repeatedly survey covering three quarters of the entire sky. Since 2010 the prototype single-mirror telescope “Pan-STARRS-1 (PS1)” has been operating on Mt. Haleakala in Hawaii. Its scientific research program is being undertaken by the PS1 Science Consortium – a collaboration between 10 research organizations in 4 countries including National Central University Taiwan. PS1 Solar System team examined genetically related asteroids amongst the near-Earth object (NEO) population — families of NEOs akin to the well known main belt asteroid families. A pre-study to check the NEO pairs/families considering orbital integrations using DE406 was achieved by using CfCA (Abe et al. 2011). A paper (Eva Schunova, Mikael Granvik, Robert Jedicke, Giovanni Gronchi, Richard Wainscoat, Shinsuke Abe, “Searching for the first Near-Earth Object family”) was submitted to *Icarus*, 2012.