Dear Colleagues,

This is the 2nd announcement of the 4th meeting of OMEG Institute
(OMEG = Origin of Matter and Evolution of Galaxies).
We hope you come and join us!

*** Dinner Party ***
A diner party is planned after the seminar.
18:00- @ Cafeteria Plaza "IKOI" (very close to IPMU Bldg.)
Please let us know your attendance by email to
<kusakabe_at_icrr.u-tokyo.ac.jp>
by "Nov. 29 5:00 p.m. (Japan time)"
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With best regards,
Conveners of OMEG Institute

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The 2nd announcement of the 4th meeting of OMEG Institute
December 1 (Wed), 2010, from 13:30
Institute for the Physics and Mathematics of the Universe (IPMU),
University of Tokyo, Kashiwa
http://www.ipmu.jp/
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1. Scientific scope
We organize the meeting of "OMEG Institute" in every few months regularly in order to discuss various subjects on nuclear astrophysics. Our purpose is to exchange expertise in this field and promote active and extensive collaborations among interdisciplinary science fields which include nuclear physics, particle physics, astrophysics and cosmology, earth and planetary science, radiochemistry, plasma science, etc. Several invited lecturers convey keynote talks in each meeting.

2. Topics
Supernova explosion and nucleosynthesis

3. Program
13:30-13:45 Ken'ichi Nomoto (IPMU)   Opening address
13:45-15:15 Christian D. Ott (Caltech)
"Black Hole Formation in Failing Core-Collapse Supernovae"
15:15-15:45 coffee break
15:45-17:15 Friedrich-K. Thielemann (University of Basel)
"Exotic Nuclei in Astrophysical Explosions"
17.15-17:30 Toshitaka Kajino (NAOJ)   Closing
18:00-   dinner party on campus at Cafeteria Plaza Ikoi
(3,500 yen)

Please e-mail us <kusakabe_at_icrr.u-tokyo.ac.jp>
by Nov. 29 5:00 p.m., Japan time,
if you are interested in attending.

4. Site and access
The meeting is held in the Conference Hall on the ground floor of IPMU, University of Tokyo, Kashiwa-Campus.
The access to the Kashiwa-Campus is found in:
http://www.ipmu.jp/visitors
The time table for buses is available from:
http://www.ipmu.jp/ipmu/webfm_send/13

5. Contact
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Conveners:
Ko Nakamura (NAOJ)
Toshitaka Kajino (NAOJ)
Motohiko Kusakabe (ICRR, University of Tokyo)
Ken'ichi Nomoto (IPMU, Universisy of Tokyo)

Abstract of talks:

Exotic Nuclei in Astrophysical Explosions
Friedrich-K. Thielemann (University of Basel)

(Hydrostatic phases of) Stellar evolution rely mostly on fusion reactions of light and intermediate nuclei close to stability, which are accessible to experiment. However, with the exception of neutron captures they encounter essential background problems at low, astrophysically relevant energies and lead to experiments at underground laboratories. Explosive burning stages produce unstable nuclei with half-lives permitting subsequent capture reactions during the burning process and thus require the knowledge of reaction cross sections for unstable nuclei. As these occur at higher temperatures (energies) and intermediate and heavy nuclei are of relevance, the resonance densities in the compound nucleus permit in most cases a statistical model treatment. However, nuclear structure

guidance is required for determining optical potentials, level densities, giant resonance information for electromagnetic transitions. In extreme cases of high proton or neutron densities the proton and neutron drip-lines can be encountered, requiring information about masses and decay properties of exotic nuclei (and possibly the treatment of direct capture contributions due to low resonance densities). This includes also for very high neutron densities the knowledge of fission barriers and the question whether superheavy nuclei can be produced in nature. Here the improvement of nuclear structure models has to go hand in hand with the increasing information from exotic nuclear beam facilities.
But this necessary nuclear structure information is only one side of the story. (Multi-dimensional) hydrodynamical modeling with radiation and neutrino transport, thus being again also dependent on nuclear input like weak interaction cross sections and the nuclear equation of state, are essential to provide the conditions under which such reactions take place. With the present information from stellar models we have a fairly good understanding of novae and X-ray burst (leading to rapid proton-capture processes) and a decent understanding of the nu-p process, occurring in proton-rich matter under high neutrino fluxes in core collapse supernova events. The rapid neutron capture process can be modeled within present nuclear uncertainties for assumed astrophysical conditions, but its real astrophysical site is still uncertain. While neutron star mergers encounter problems in explaining the temporal element evolution of galaxies, core collapse supernovae still lack an explanation for obtaining the required thermodynamic properties of the the hot plasma, i.e. a large neutron density and/or high entropies.

Black Hole Formation in Failing Core-Collapse Supernovae
Christian D. Ott (California Institute of Technology)

The cores of massive stars collapse to protoneutron stars, forming, at core bounce, a hydrodynamic shock that initially travels outward in mass and radius, but soon stalls, needing revival by the supernova mechanism. If the latter lacks efficacy, the protoneutron star may reach its maximum mass before an explosion is launched, leading to a second stage of gravitational collapse resulting in the formation of a black hole. Under special, yet to be determined conditions, a black hole -- accretion torus system may form in such failing supernovae and act as the engine of a long gamma-ray burst. I present results from new 1.5D (spherical symmetry plus rotation) simulations that show the systematics of black hole formation with progenitor mass, metallicty, rotation, and nuclear EOS, and lead to new theoretical constraints on the birth spin of black holes.
I go on to present the first 3D simulations of black hole forming core collapse events that track the evolution from the onset of collapse, through the protoneutron star phase and protoneutron star collapse to multiple tens of milliseconds after the appearance of the black hole horizon.
