

宇宙線・宇宙物理領域、理論核物理領域合同シンポジウム
重力波源とその電磁波、ニュートリノ対応天体

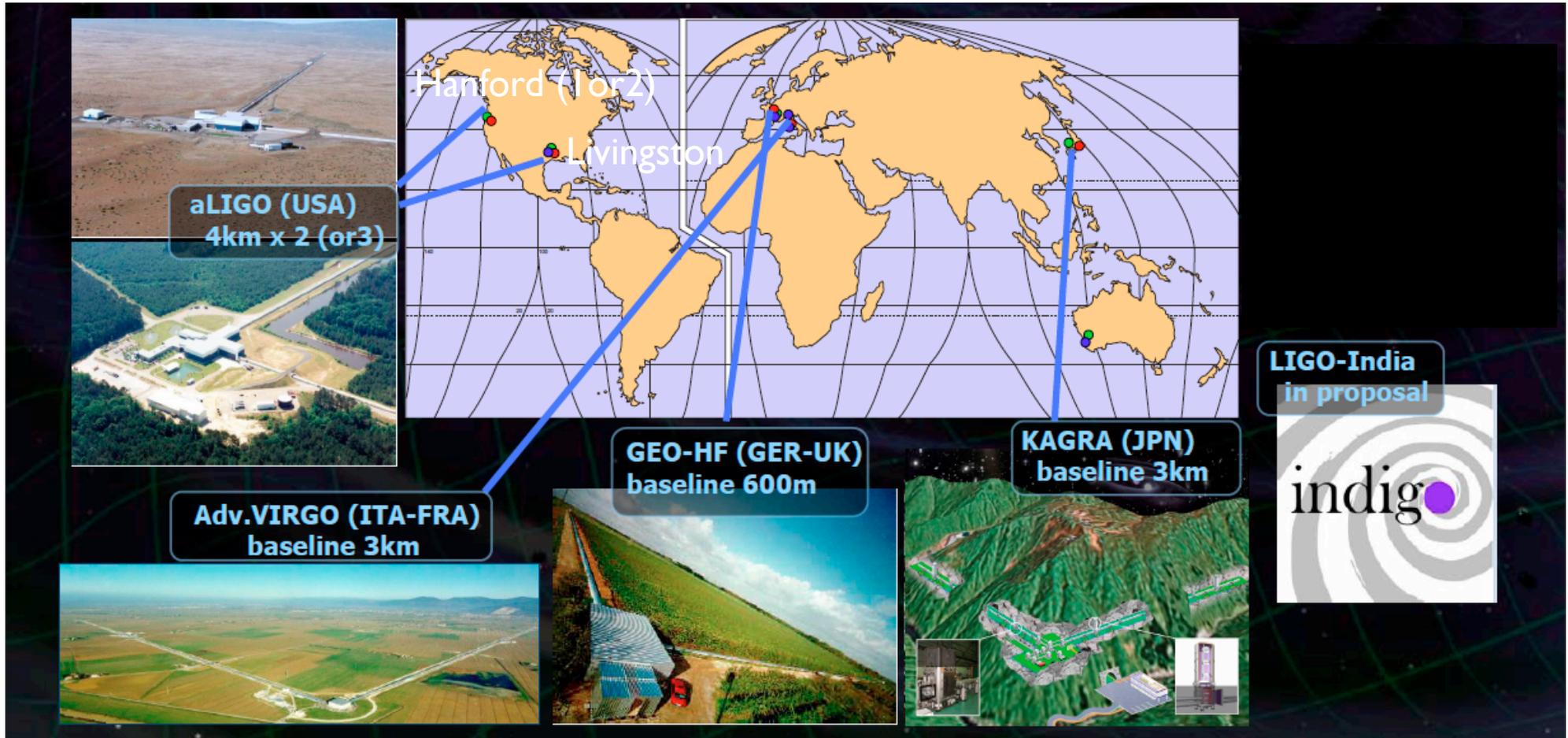
はじめに

井岡 邦仁 (KEK, Sokendai)



2nd Generation of GW Observatories

©Ando



GW will be directly detected within ~5 yr

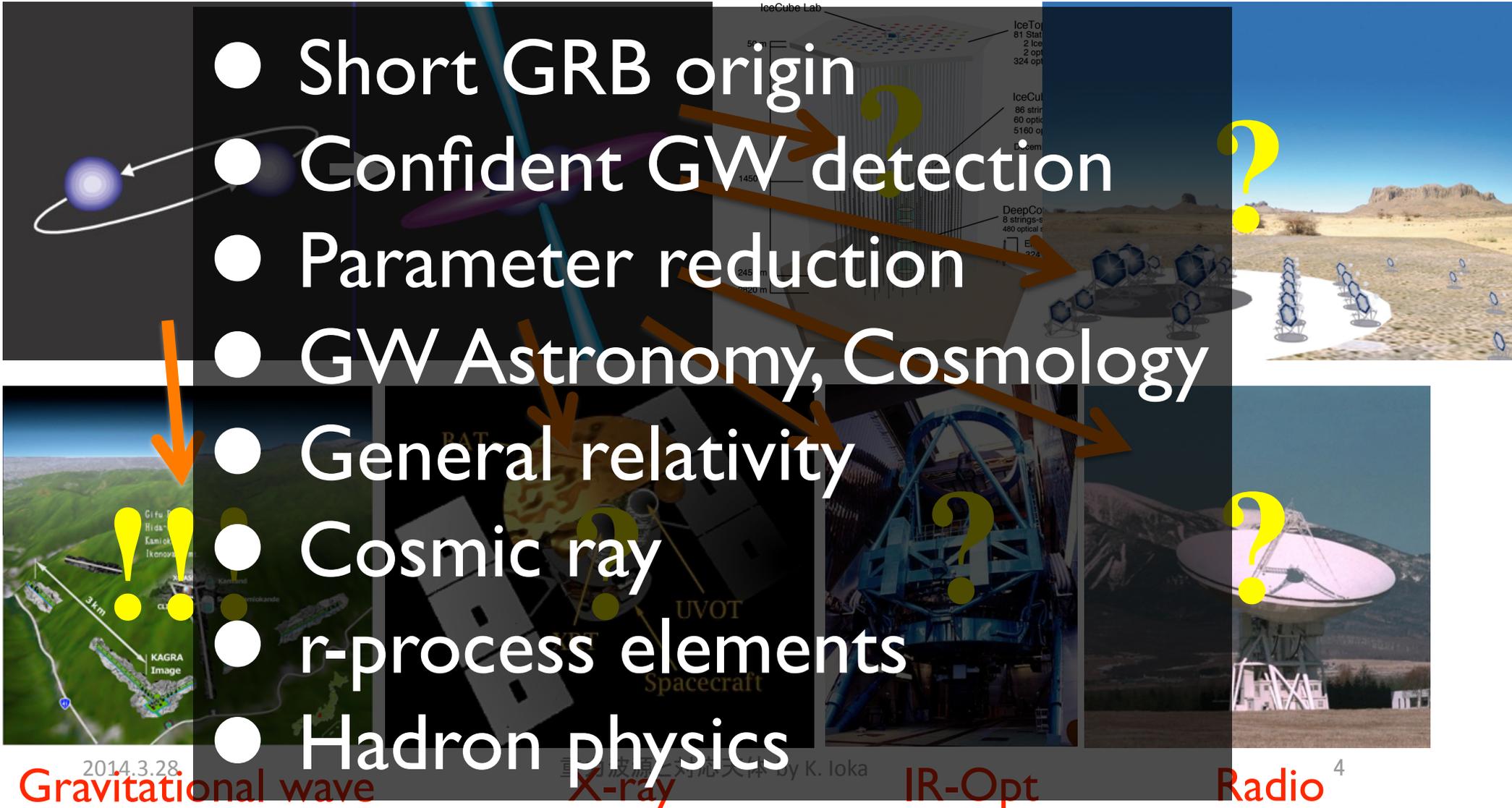
Counterparts to GW

Gravitational Wave Sources

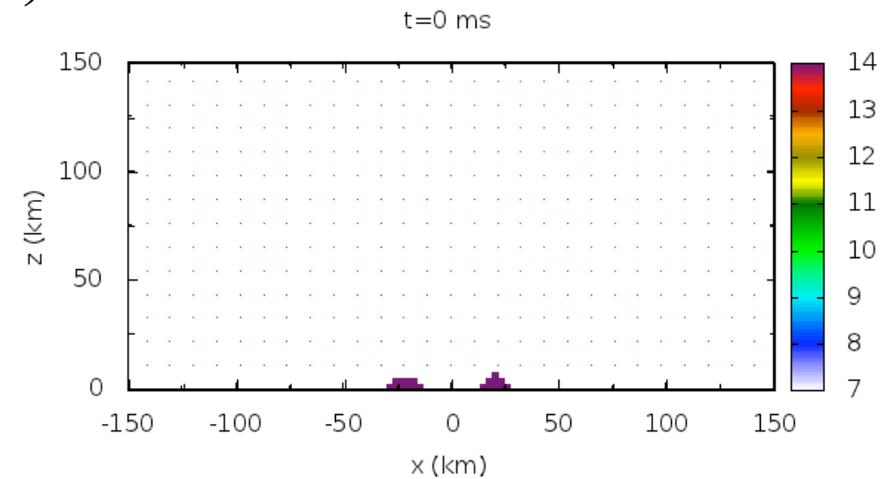
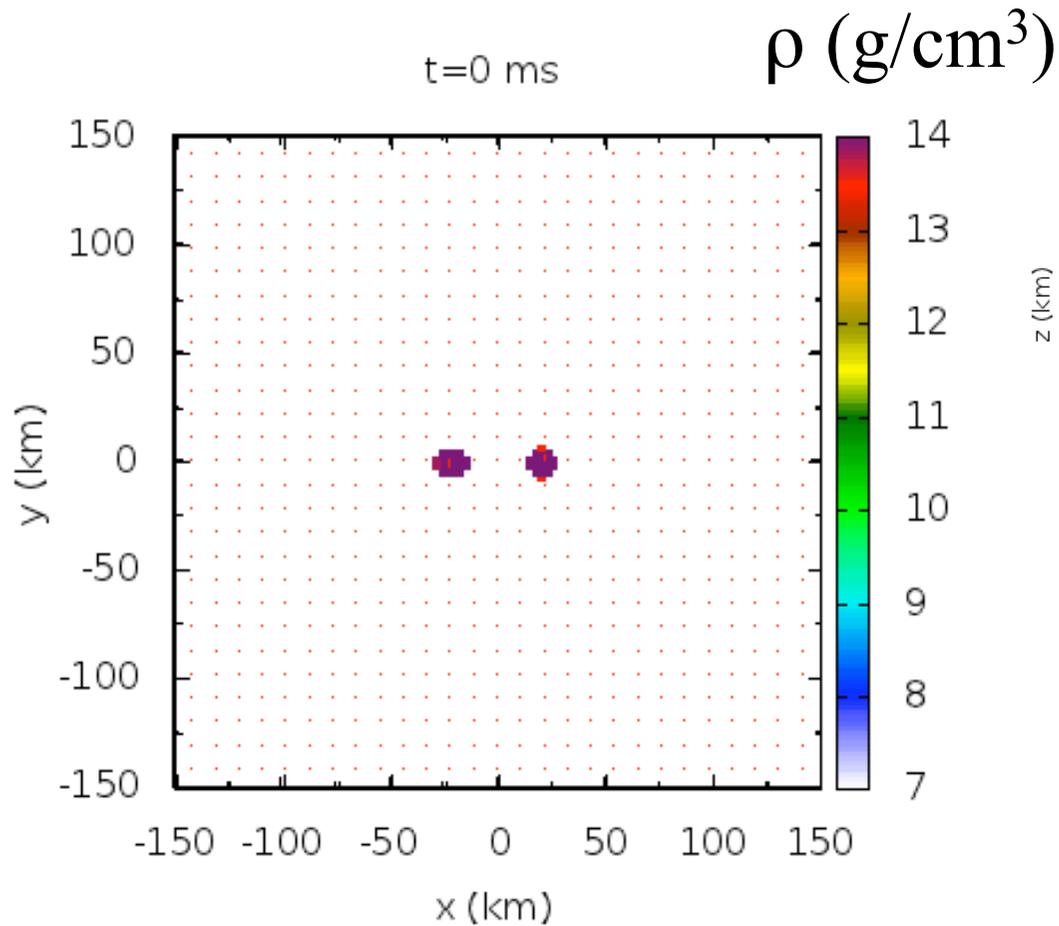
Neutrino

Gamma-ray

- Short GRB origin
- Confident GW detection
- Parameter reduction
- GW Astronomy, Cosmology
- General relativity
- Cosmic ray
- r-process elements
- Hadron physics



Merger of 1.3-1.4 M_{sun} NS: EOS=APR4: stiff but relatively soft



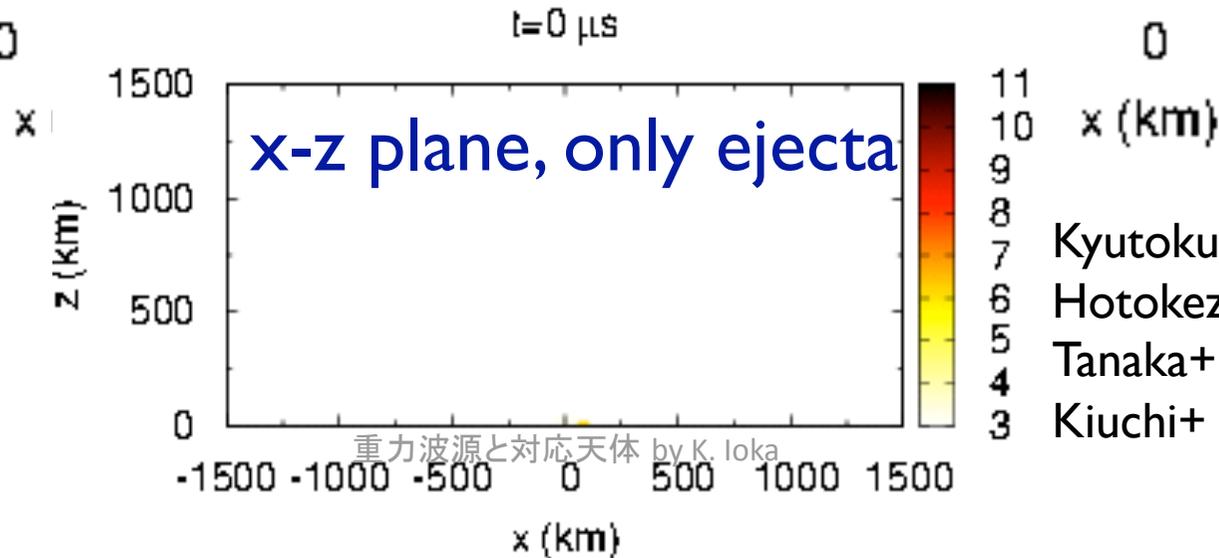
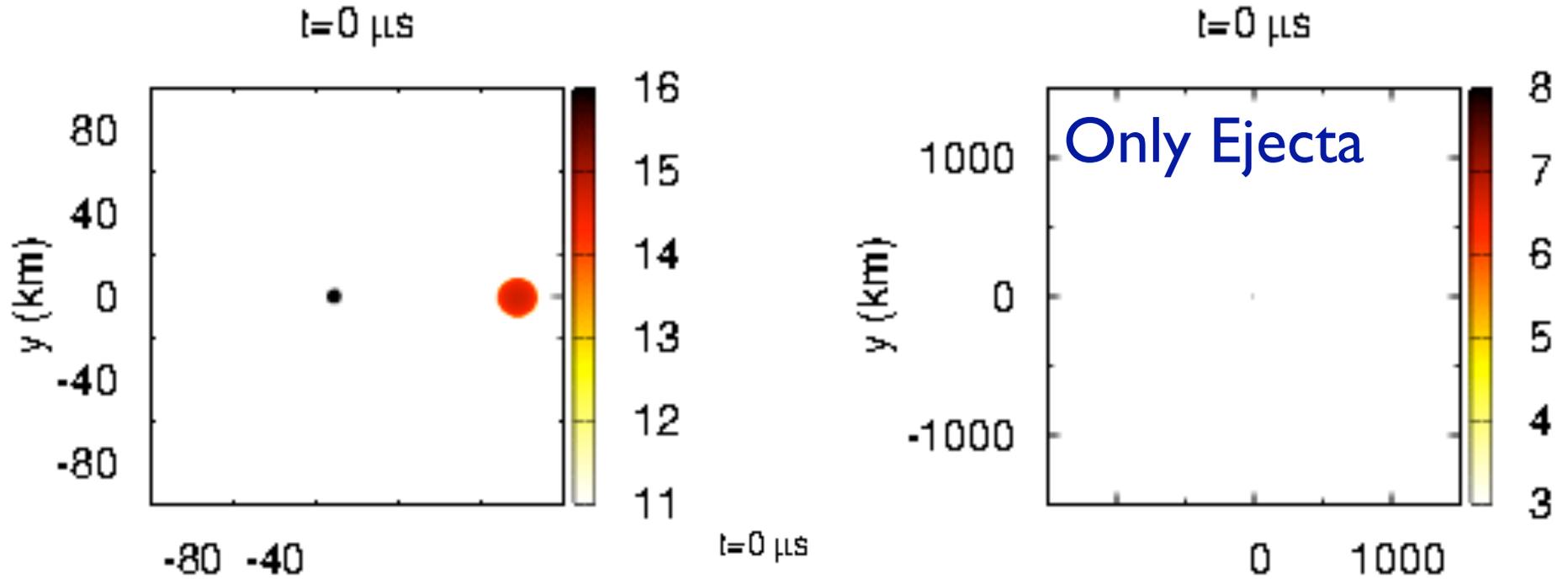
Relatively wider view

Orbital plane

X-Z plane

BH-NS Merger

©Kyutoku

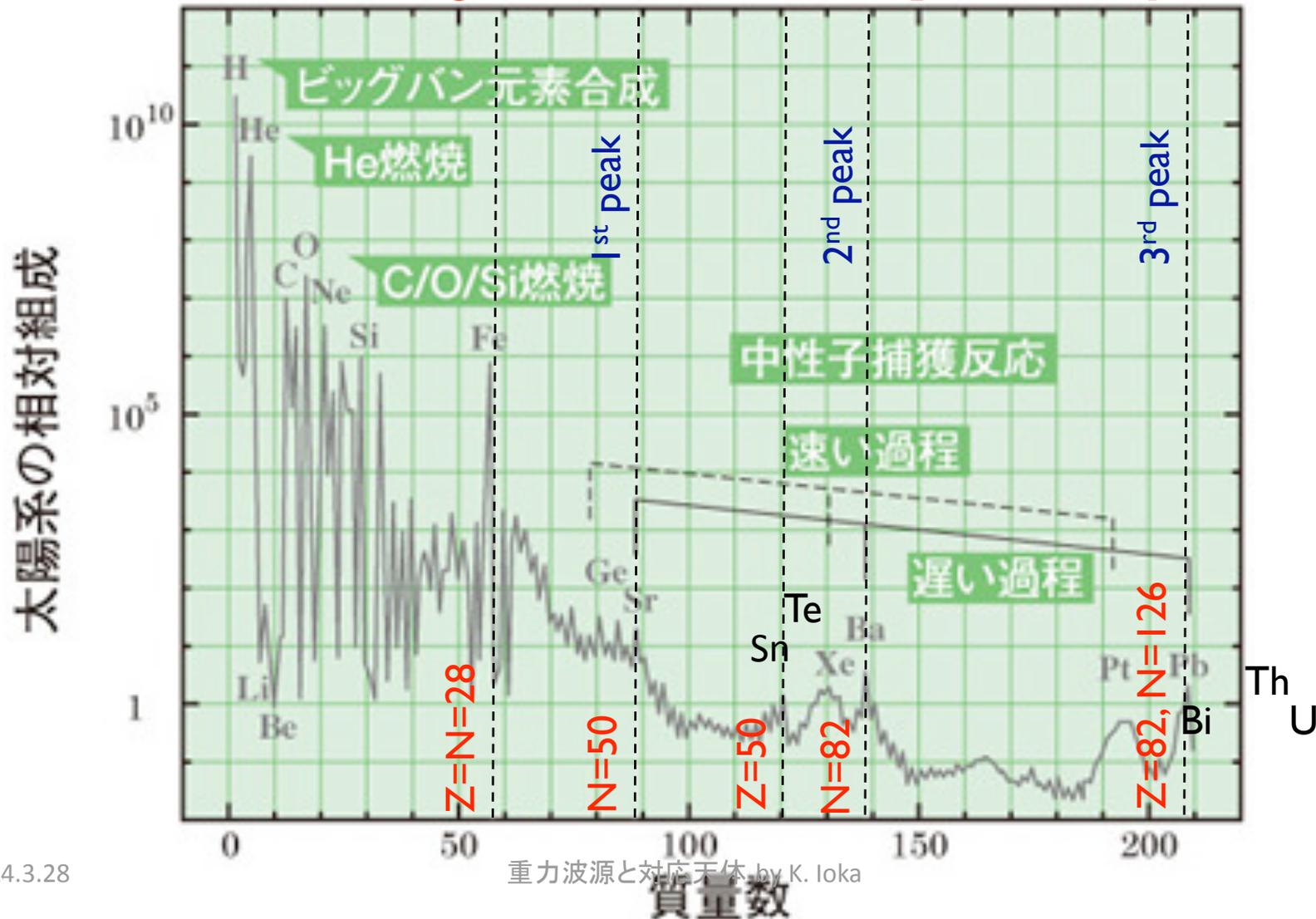


Full GR
 $Q=5$
 $\chi=0.75$
 H4 EOS

Kyutoku, KI & Shibata 13
 Hotokezaka+ 13
 Tanaka+ 14
 Kiuchi+ 14

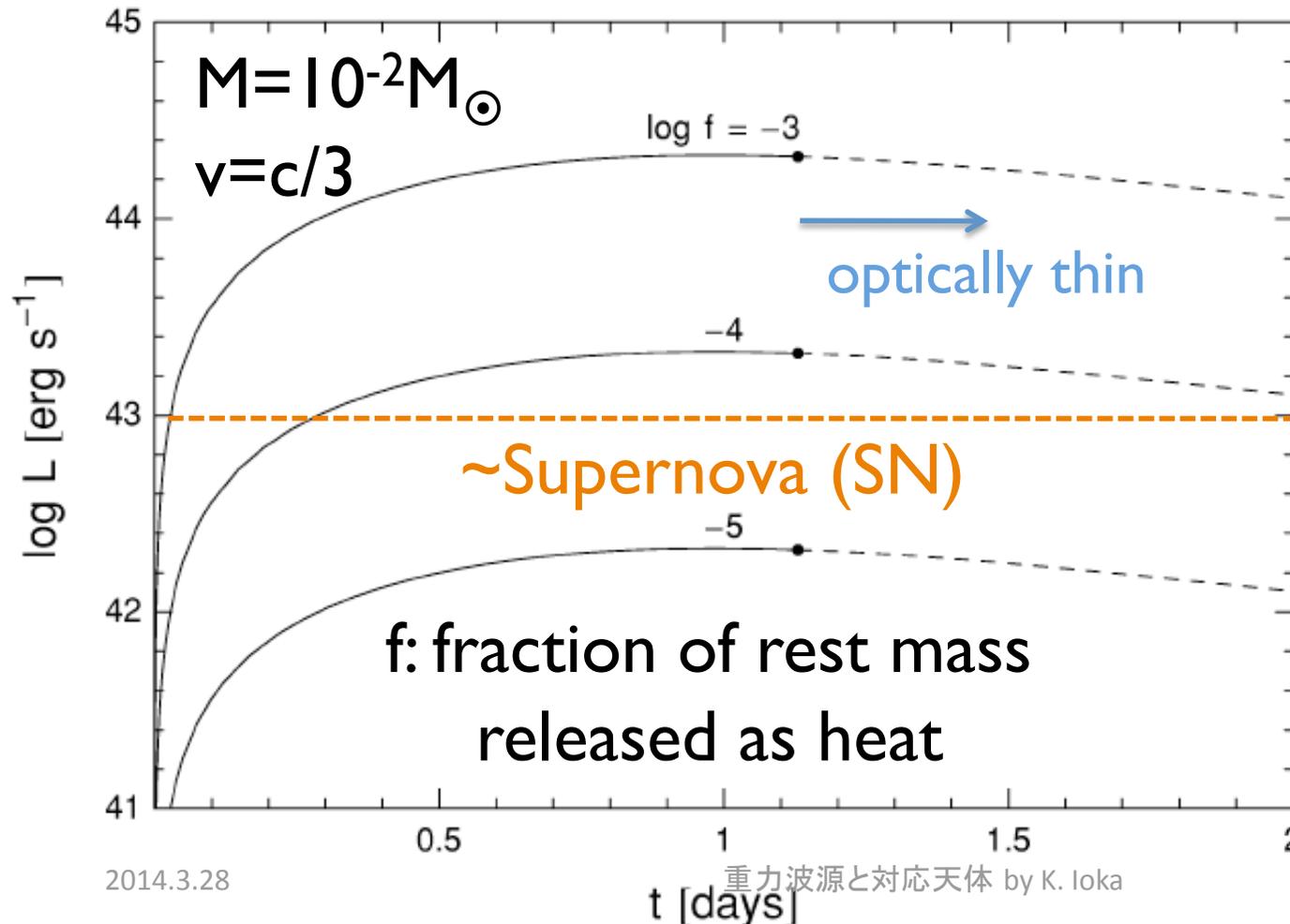
r-Process

Neutron-rich Ejecta \Rightarrow n -capture $>$ β decay



Macro/Kilo-nova

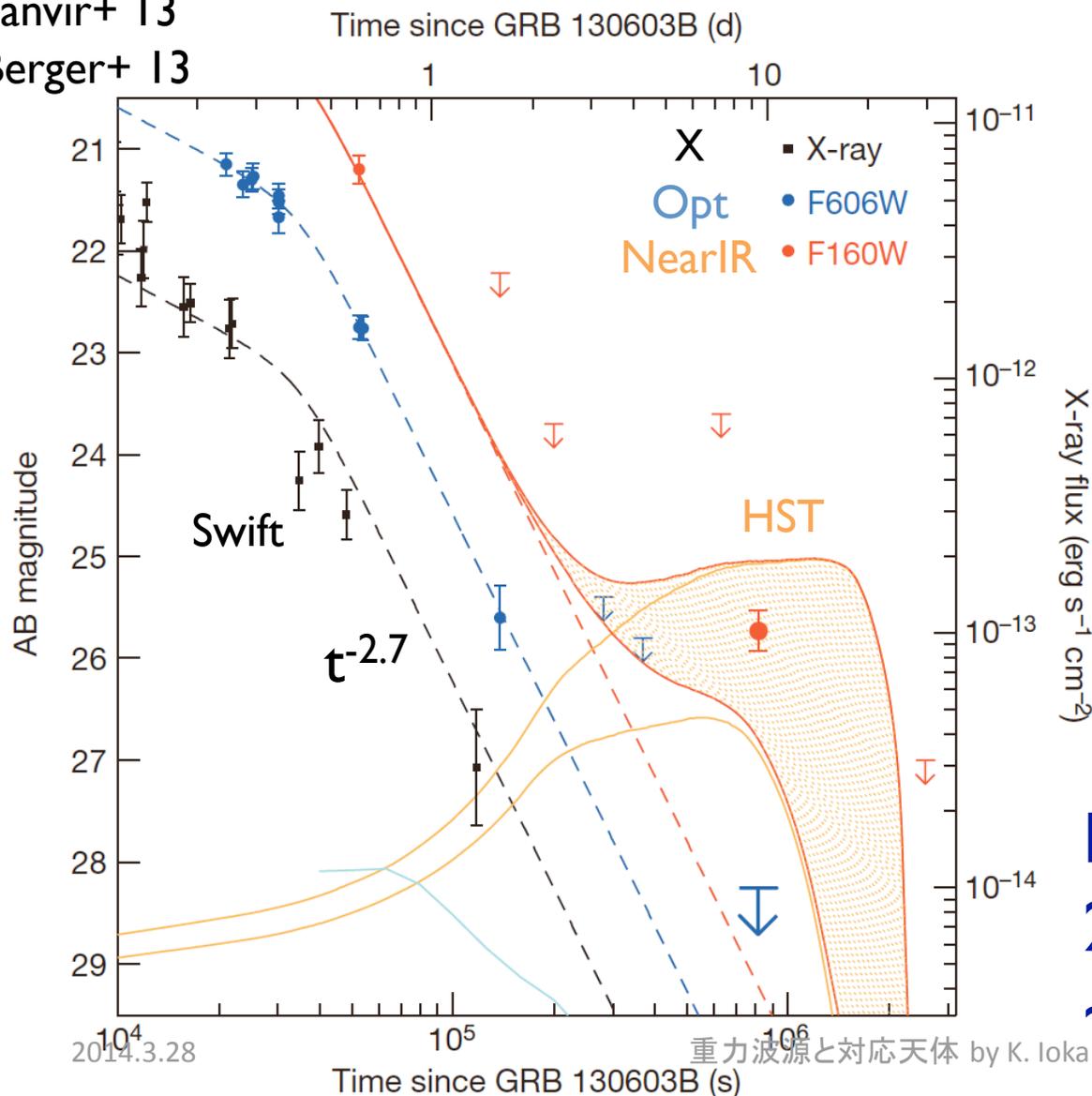
Radioactivity (r-process \rightarrow β -decay, fission, neutron)



- 超新星-like
- Duration $\propto (M/v)^{1/2}$
- $T \propto (f^2/Mv)^{1/8}$
- \sim IR-Opt
- $f \sim 3 \times 10^{-6}$
- \Rightarrow 暗い超新星

Discovery of Macro/Kilo-nova?

Tanvir+ 13
Berger+ 13



Ejecta with
 $\sim 0.01 - 0.1 M_{\odot}$
 $\sim 0.1 - 0.3c$
 $\sim 10^{50} - 10^{52} \text{erg}$
Radioactivity
 $f \sim \epsilon_r / mc^2 \sim 3e-6$

$L \sim 10^{41} \text{erg/s}$ @ $z \sim 0.356$
 22-23 mag if @ 200 Mpc
 ~ 10 days

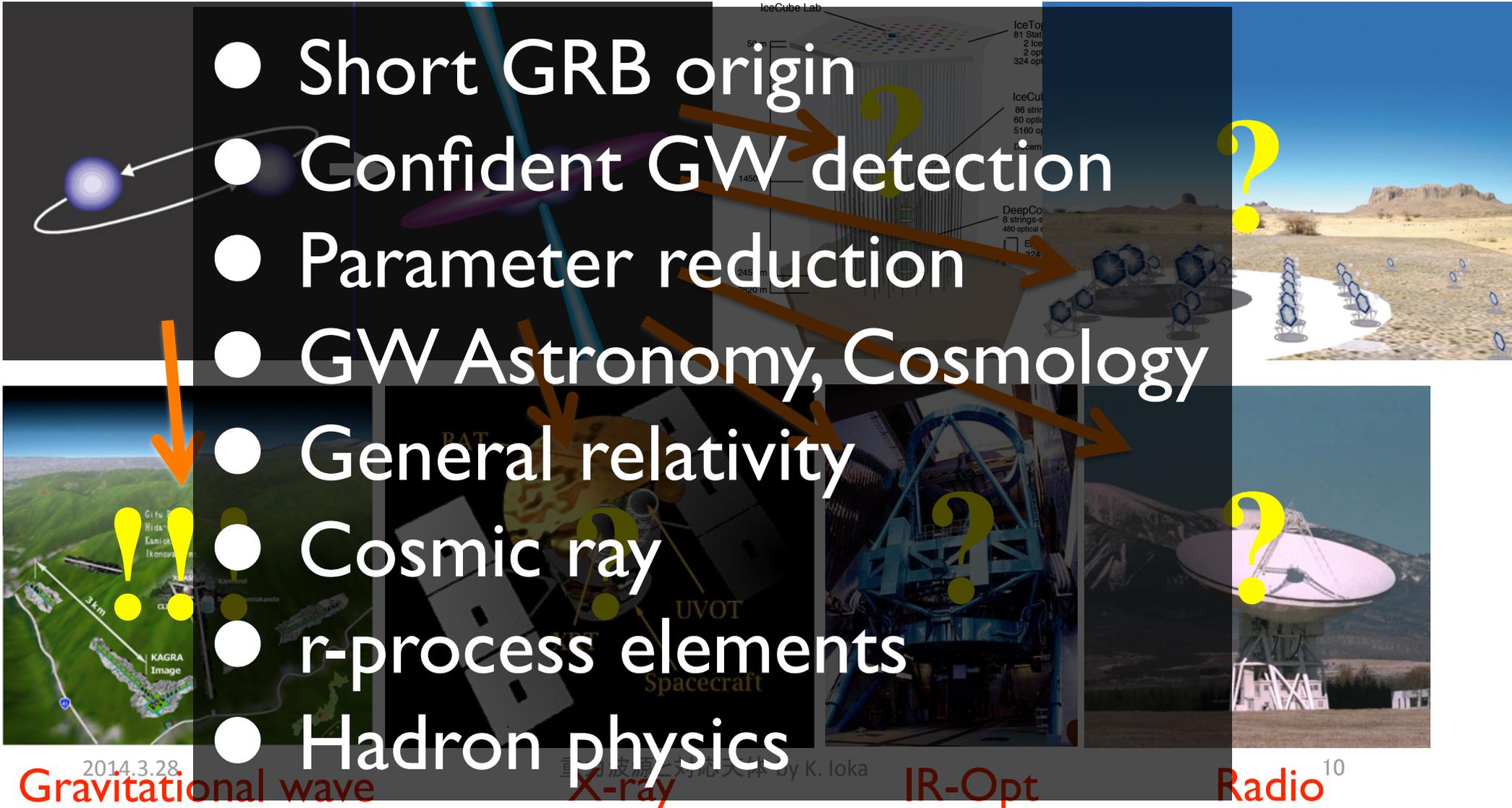
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Gravitational wave

X-ray

IR-Opt

Radio¹⁰