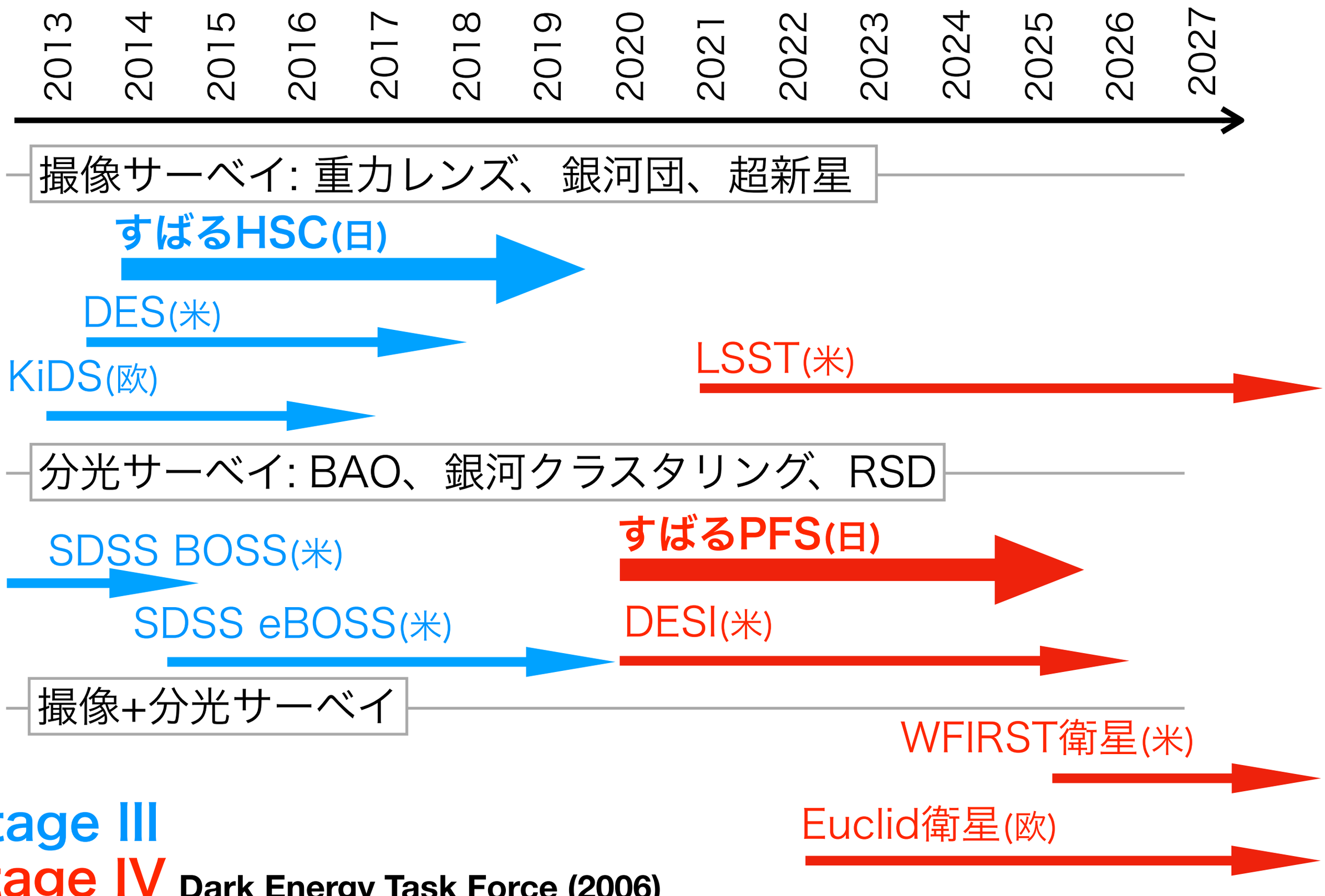
2030年代に期待する望遠鏡/装置

- 宇宙論の観点から -

宮武広直

名古屋大学

2020年代までの宇宙論銀河サーベイ



Stage III

Stage IV **Dark Energy Task Force (2006)**

Stage V?

arXiv:1604.07626
arXiv:1802.07216

Cosmic Visions Dark Energy

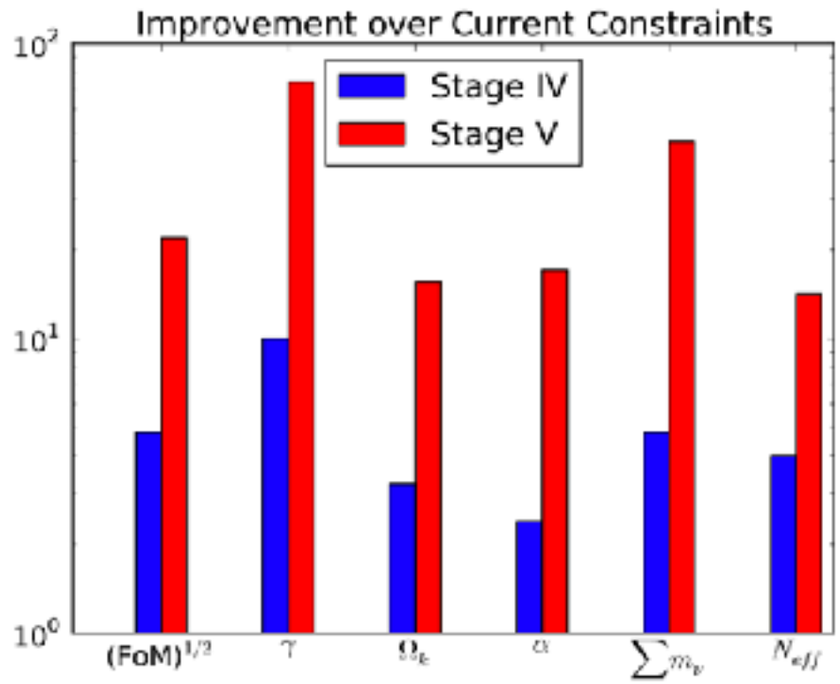
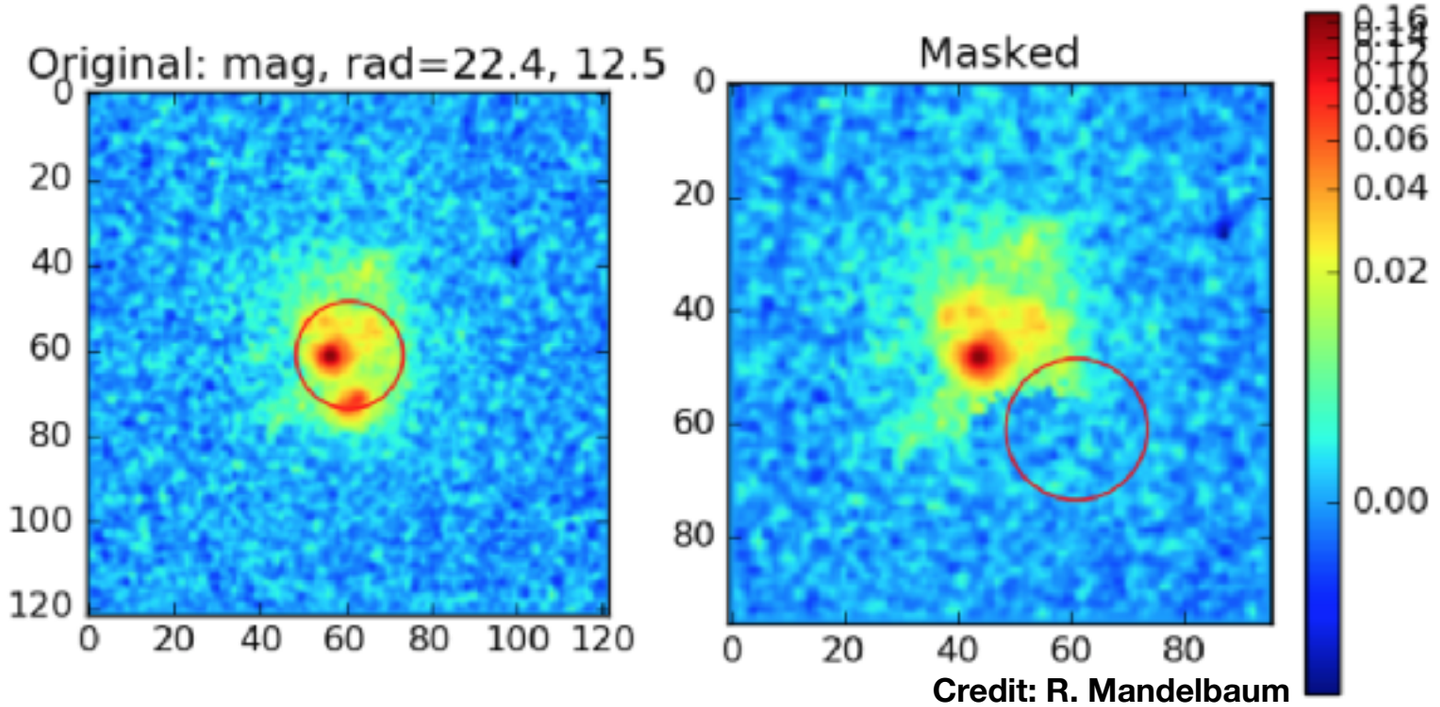


Figure 2. *Projected improvement (note the log scale) in constraints on parameters of dark energy (the Figure of Merit is inversely proportional to the allowed region in the w, w' plane and γ parametrizes the rate at which structure grows); inflation (curvature Ω_k and running α); and neutrinos. The blue bar shows projected improvement over current constraints expected from the Stage IV experiments DESI and LSST, and the red bar shows improvements over current from a Stage V survey, indicating that there will still be large potential gains left even after the Stage IV surveys, DESI and LSST. Details: Current constraints vary depending on which datasets are used. The current constraints used here come from a projection of Planck and BOSS data and are roughly equivalent to those in the Planck cosmological parameter paper. Projections for Stage IV assume Planck + DESI + LSST going out to scales $k = 0.2\ h\ Mpc^{-1}$. The projections for Stage V assume spectra for LSST galaxies and include information out to $k = 0.5\ h\ Mpc^{-1}$.*

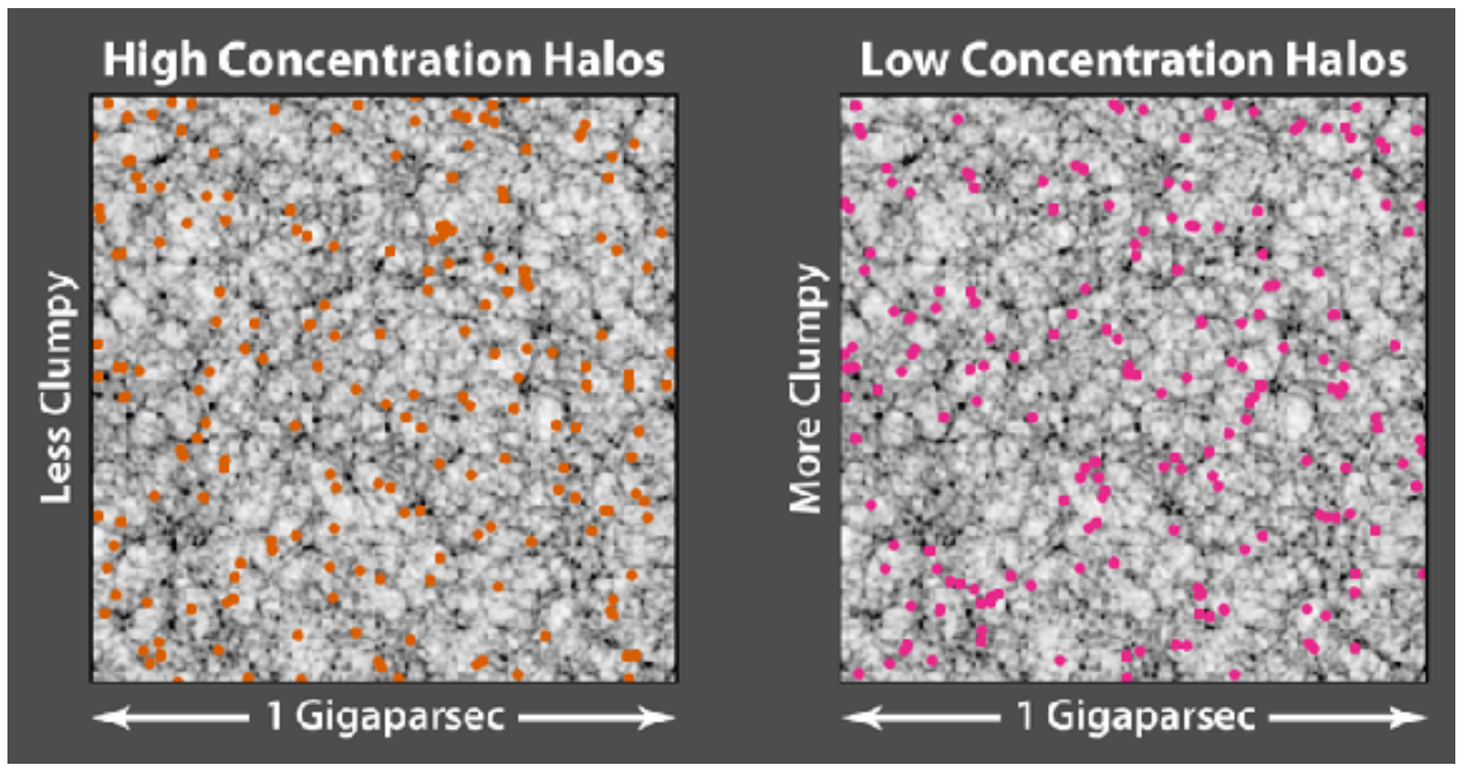
- Preparing for next-generation experiments. What we learn in the next ten years from DESI and LSST will inspire the next generation of Stage V experiments. If LSST and DESI do find evidence for physics beyond a cosmological constant, we will need to pursue a new observational program that leverages all modes so far unexplored to resolve those exciting results. If the Stage IV experiments find consistency with a cosmological constant, we will have to test this finding at even higher level of precision and fully test the assumptions of General Relativity in the cosmological model. The simplicity of the background cosmology in the scenario of a cosmological constant would also enable Stage V experiments to offer sharper tests of physics such as the nature of dark matter, neutrinos, inflation, and dark radiation candidates. Well-understood advantages and limitations of the most advanced technologies used in Stage IV gives us foresight to begin development today toward the technologies that will be needed

これからの光赤外精密宇宙論

- 測定における課題
  - 測光的赤方偏移における系統誤差
    - Blended objects
- 理論的な展望
  - 修正重力理論
  - 宇宙論と銀河・銀河団形成



Credit: R. Mandelbaum



Prada et al. (2012)

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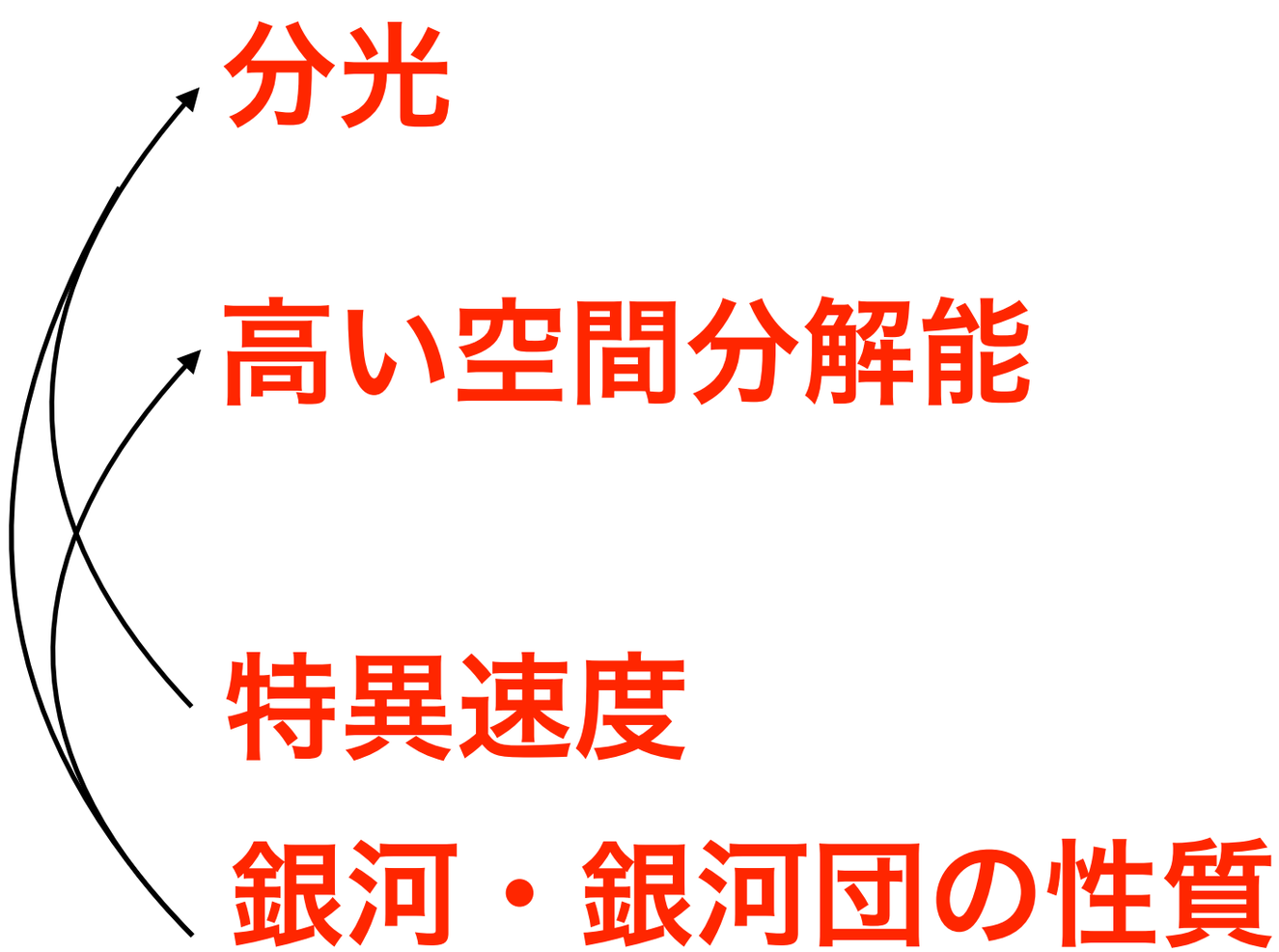

2030年代は？

- 王道: 大口径広視野宇宙分光サーベイ
  - 15m級の主鏡 cf) LUVOIR
  - 高空間分解能、多天体分光
  - 6年程度かけて約１億個の銀河を観測
- 飛び道具: 超小型衛星の編隊飛行ミッションによる全天分光サーベイ
  - Spherex (NASA MIDEX proposal, $200M, 20cm mirror, linear variable filter, 3.5deg^2, 6.2’/pixel) よりも低予算かつ深い？
  - 低分解能: どこまでよくできる？
  - 2020年代から可能？
- 確実: すばる望遠鏡
  - HSCとPFSで北天を観測
  - GLAOで多天体分光（高空間分解能）