

Structure Subgroup

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Charge

- What are our “long-term aspirations”?
 - next 10-20 yrs, facilities report b.c.
- What discovery opportunities are we excited to share with our colleagues and agencies?
 - discovery of accelerating universe is difficult act to follow
 - “Einstein was wrong” vs $w = -1.005 \pm 0.001$

Writing

- ~20 pages from this group (?)
- ~20-page CF5 summary (1/6)
- ~30-page CF summary (1/6)
- ~30-page Snowmass summary (1/3)
- bullet points for DPF meeting
- most people will only read 1 paragraph on structure: focus on this first?
- is there a single plot that tells our story?

Resources

- Rocky-III summarizes discovery opportunities and outlines path from Stage III to IV, focusing on DOE role.
- Weinberg et al 2012 provides quantitative Stage IV projections and covers key systematics relevant to structure
- LSST DESC whitepaper provides detailed roadmap for highest priority tasks over next 3 years

What is our scope?

- “Spatial distribution of LSS and its growth in cosmic time”
 - What are the projected DE/MG constraints? (Weinberg et al)
 - How to address cluster and weak lensing systematics? (Weinberg et al + LSST DESC whitepaper)
 - What missing experiment could improve MG constraints a lot? (do we have a MG theory?)
- Scope does not include BAO distance scale or cross correlations

Stage IV Facilities for Structure

- (Chime 2016-18)
- MS-DESI 2018-22
- LSST 4+2+10 years (2020-30?)
- Euclid 6-year mission (2020-26?)
- WFIRST? balloon platform? ultra-deep spectro survey?

Importance of Overlaps?

- Imaging + spectro
- optical + X-ray + SZ + ...
- FOM forecasts vs intuition
- risk mitigation

Beyond Stage IV

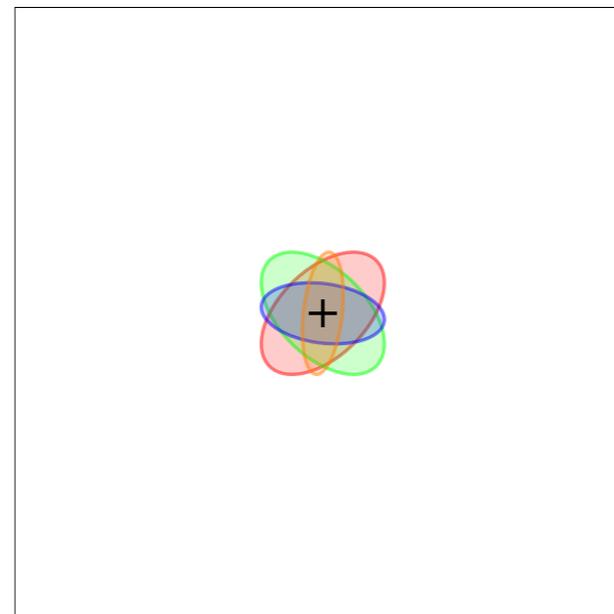
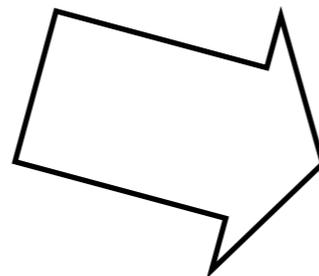
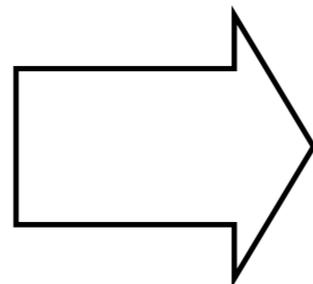
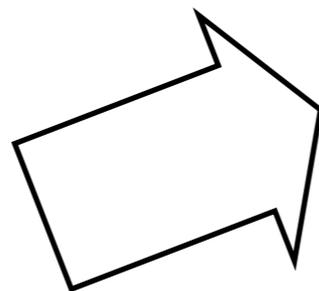
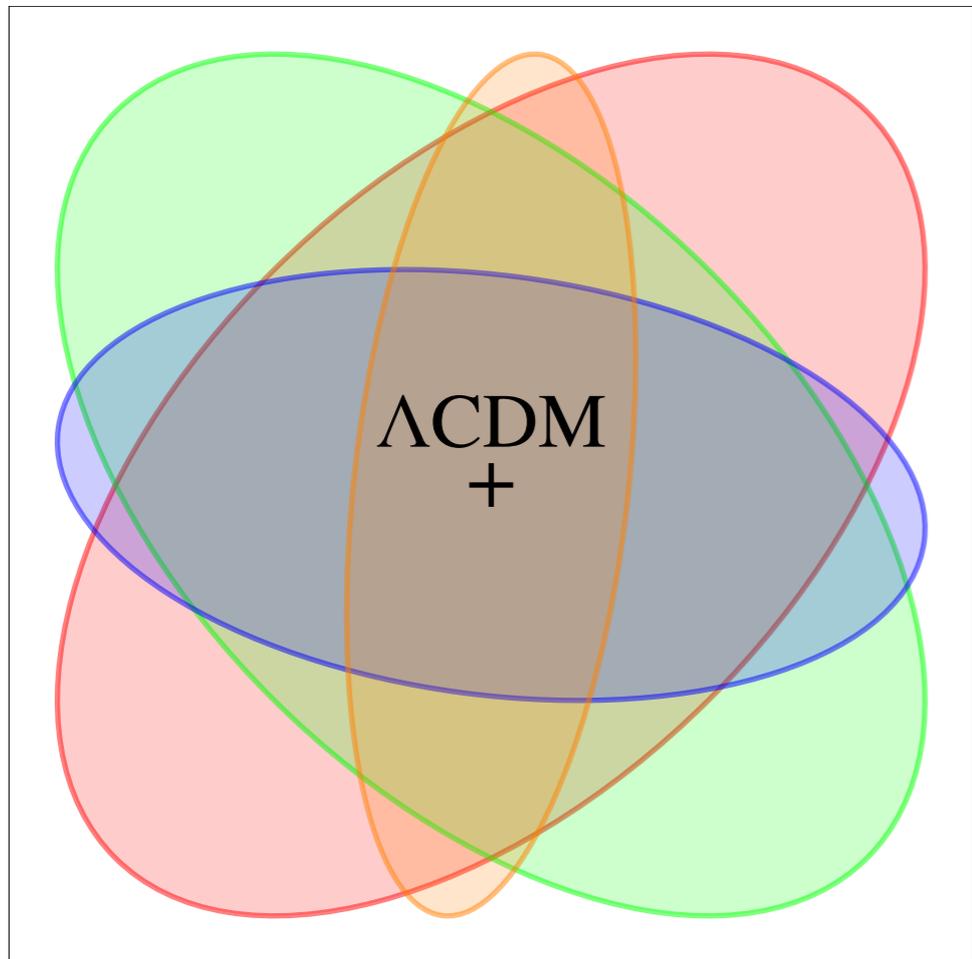
10-20 yr horizon (2023-33) implies start of stage V and planning for stage VI.

Need a roadmap that is responsive to what we learn in going from stage III to IV.

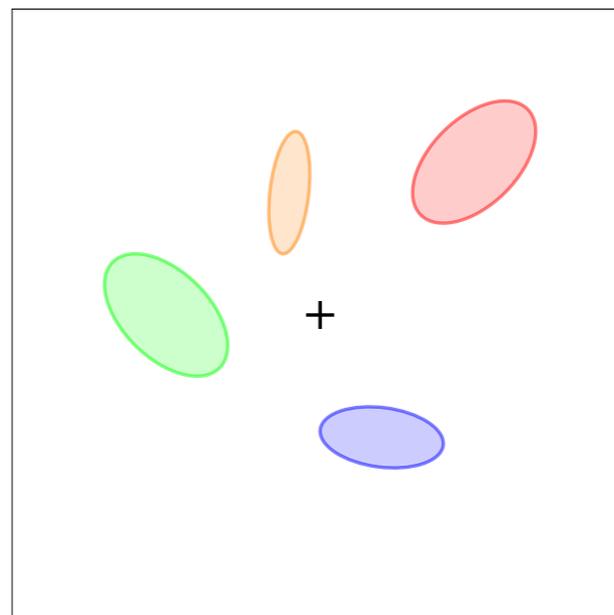
Roadmap encompasses a lot more than CF5b.

Can identify some generic scenarios to frame the discussion.

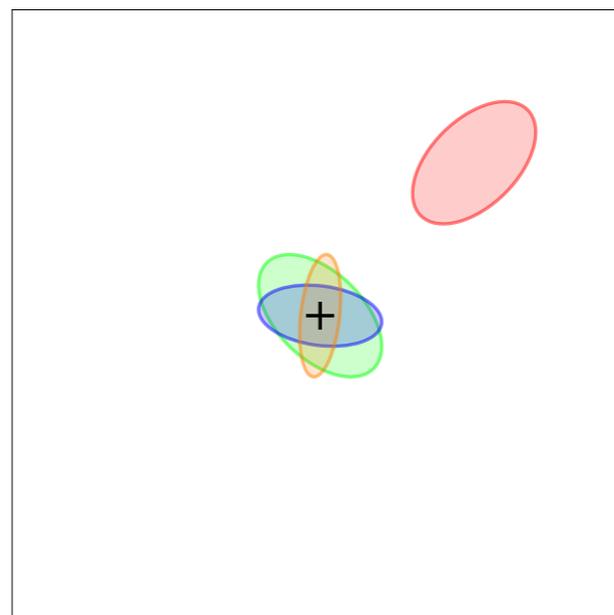
Stage III



Stage IVa

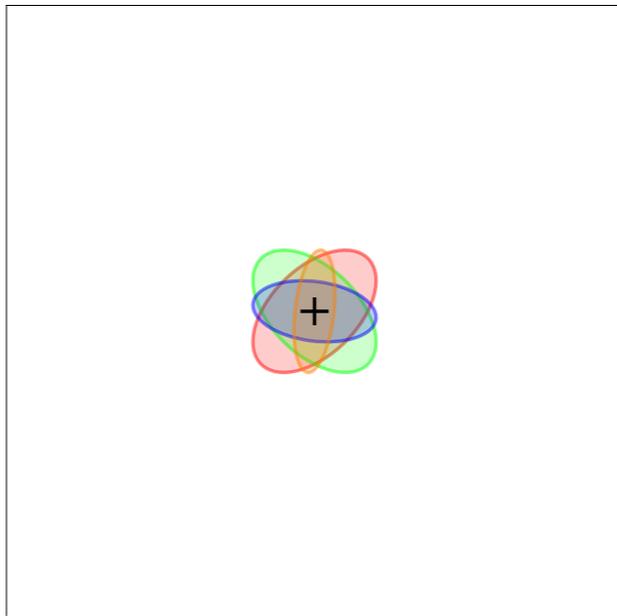


Stage IVb



Stage IVc

Stage IVa

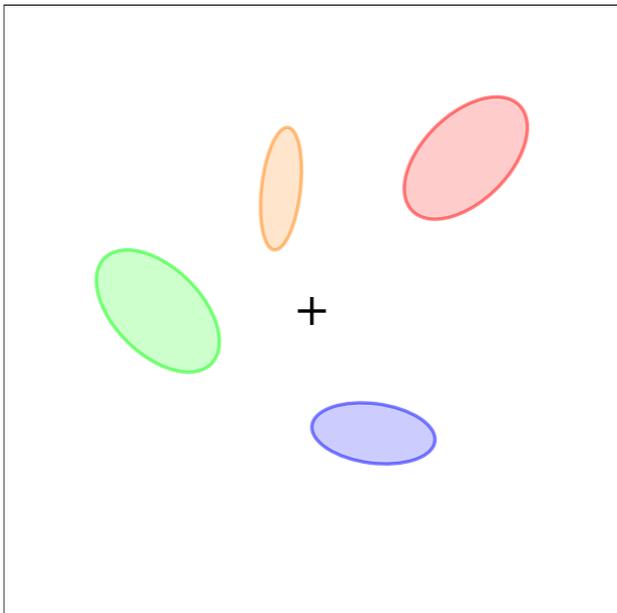


Is there a compelling new theory
that has not been excluded?

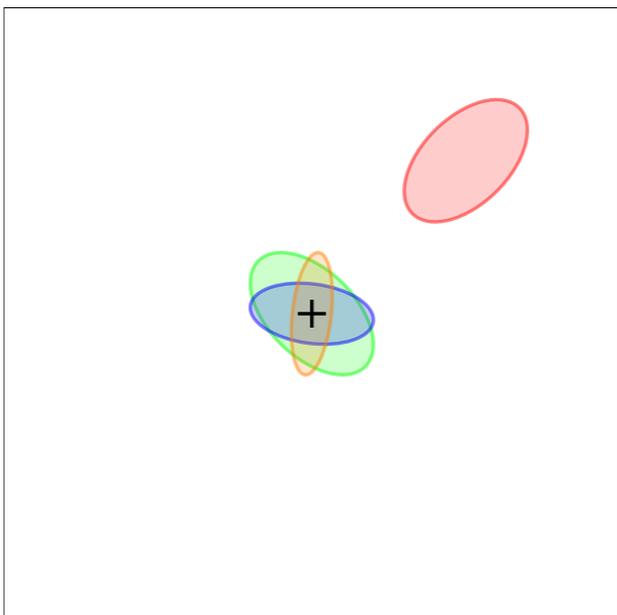
YES: proceed to stage V

NO: done for now?

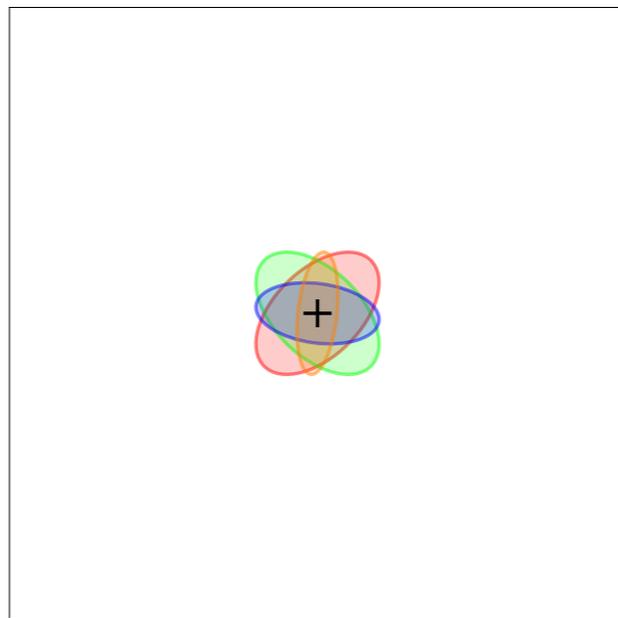
Stage IVb



Stage IVc



Stage IVa

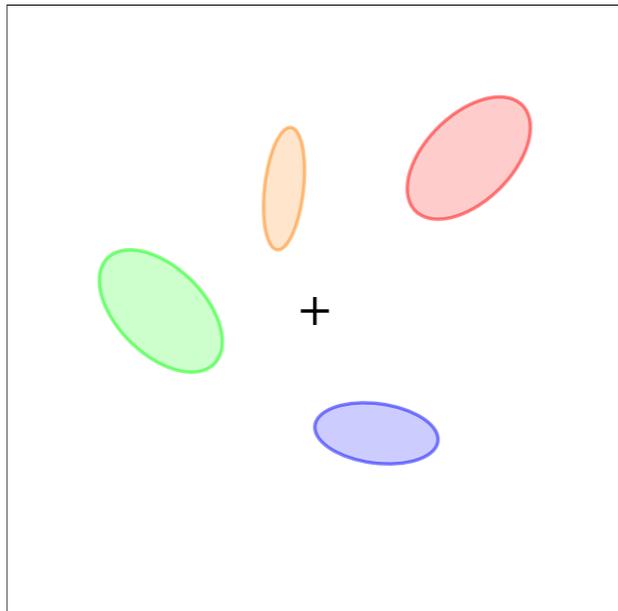


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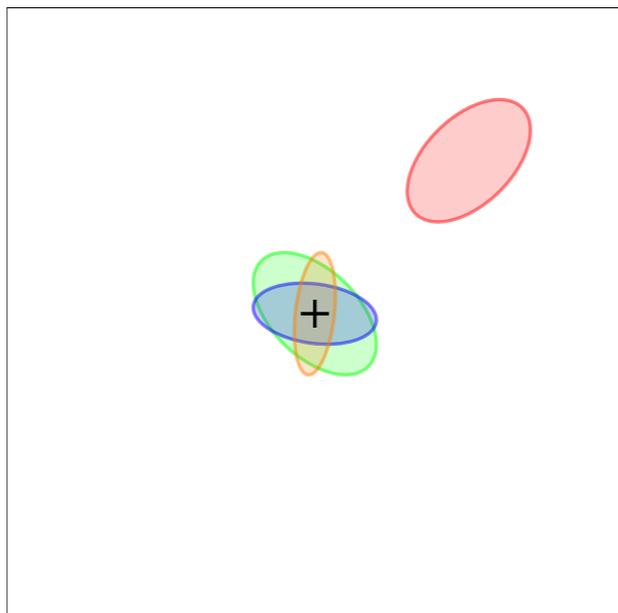
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Stage IVb

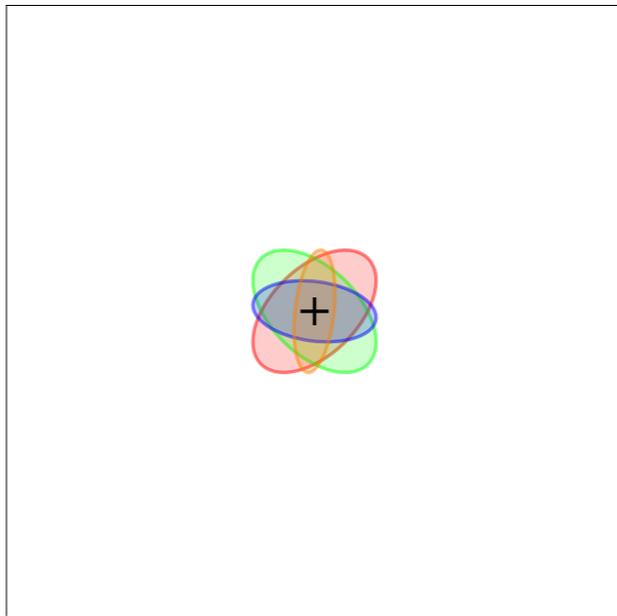


We need a new theory. Find it, then proceed to stage V for validation and refinement.

Stage IVc



Stage IVa

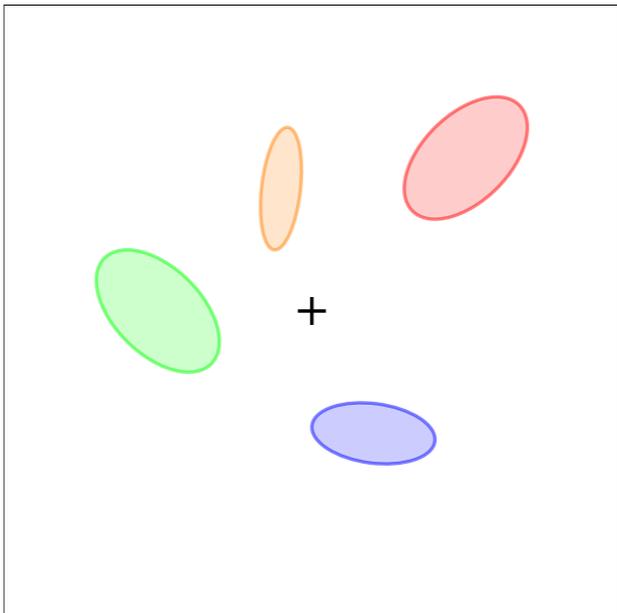


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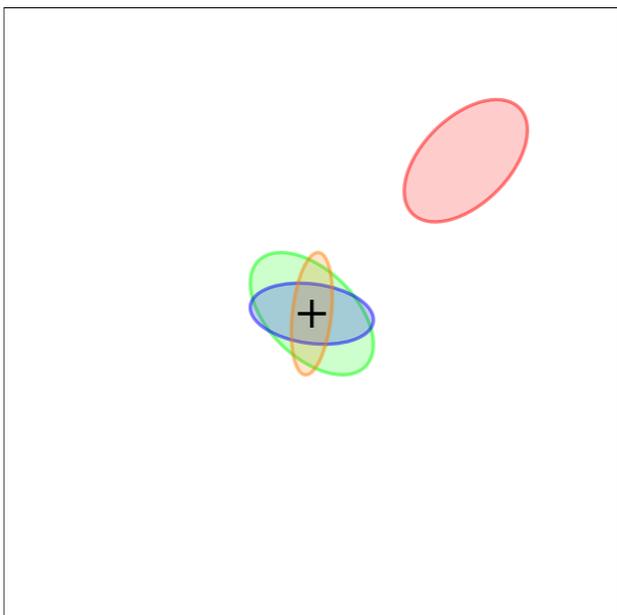
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Stage IVb



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Stage IVc



Do we really understand our systematics? Limited scope stage IV.5 to clarify picture.

- Vigorous ongoing program of technology R&D development essential in all scenarios:
 - 50,000 fiber spectrograph
 - advanced sensors: MKIDS, SiPD, ...
 - expand survey boundaries: area, depth, wavelength, pixel scale, timing, ...
- Essential to fully exploit stage III data to develop and refine analyses
- Need large simulations responsive to project needs