



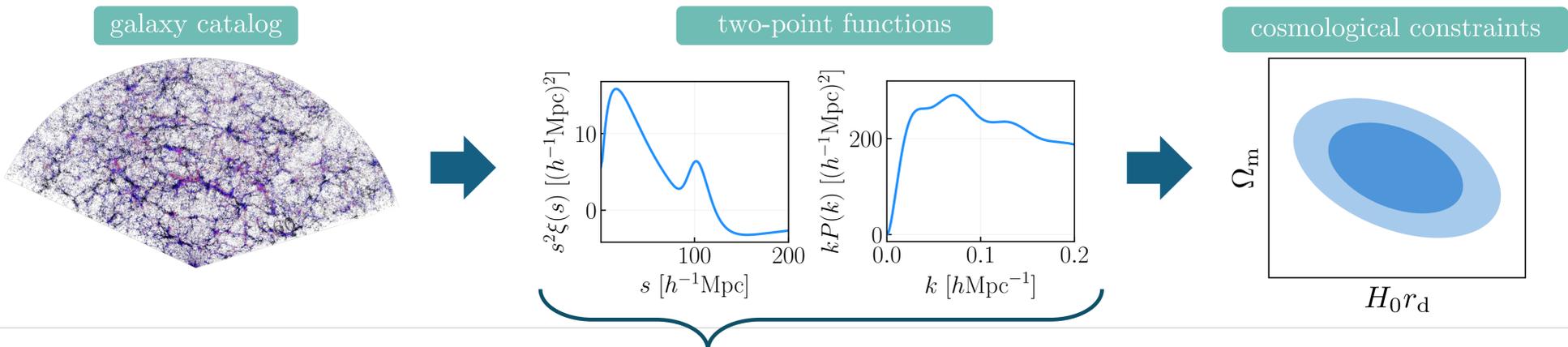
A unified emulator pipeline for alternative clustering statistics

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credits: DESI Alternative Clustering Methods (ACM) topical group

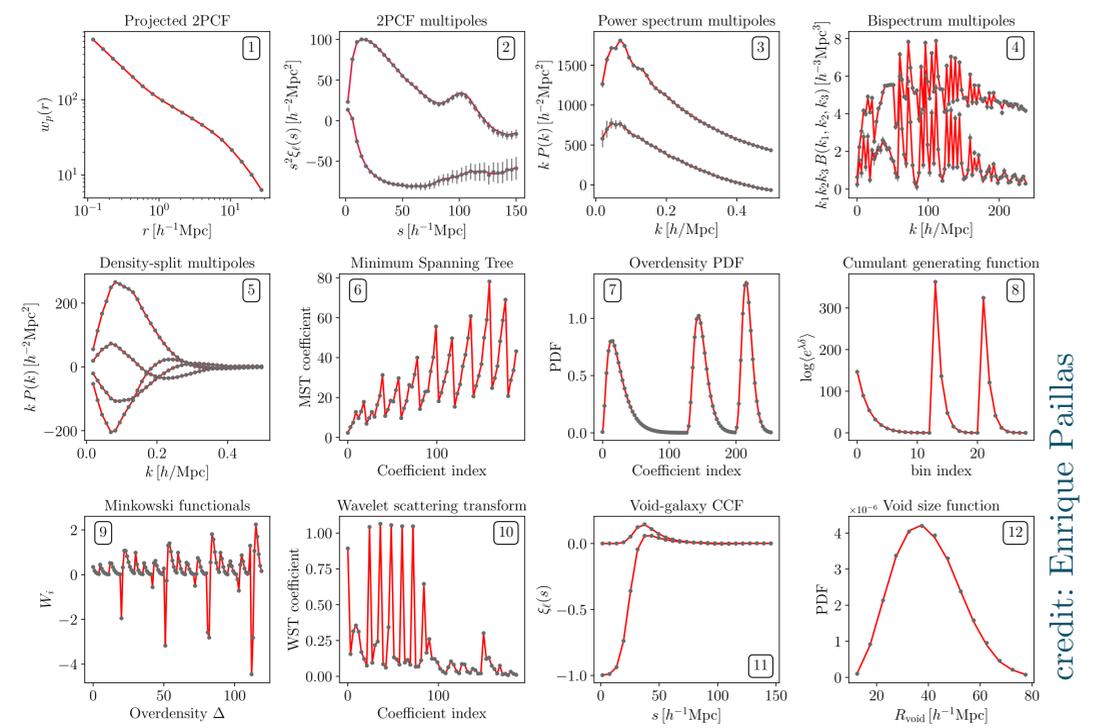
How do we extract information from galaxy surveys?

The current standard approach is to compress information into two-point statistics.



Alternative Clustering Methods (ACM)

Higher-order and alternative statistics can capture information beyond the variance of the field.



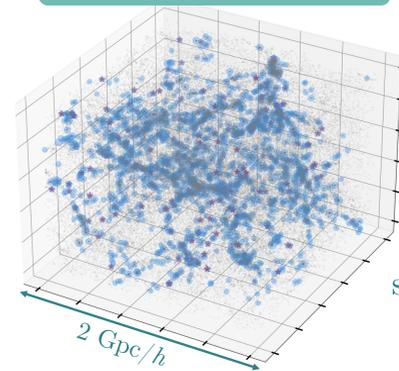
credit: Enriquer Paillass

SUNBIRD emulator

Cuesta-Lazaro+24

Training a neural network to learn any summary statistics from simulations

29,750 simulations



AbacusSummit
N-body simulations

Halo Occupation
Distribution (HOD)
populate DM-only
simulations with galaxies

85 cosmologies

350 HODs each

8 cosmo.
parameters

12 HOD parameters

Λ CDM (h fixed)

standard HOD parameters

w_0, w_a

velocity bias

$d n_s / d \ln k$

concentration secondary bias

N_{eff}

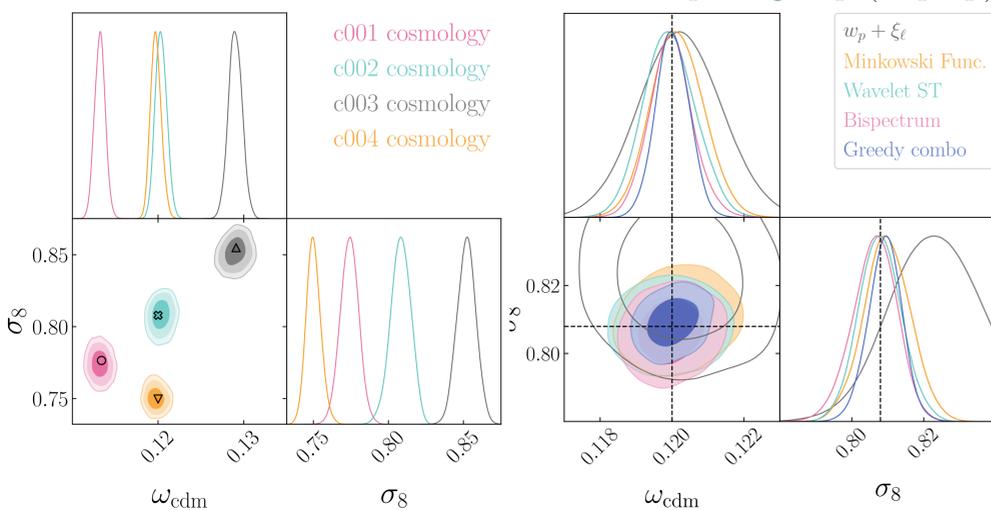
environment secondary bias

satellite profile flexibility

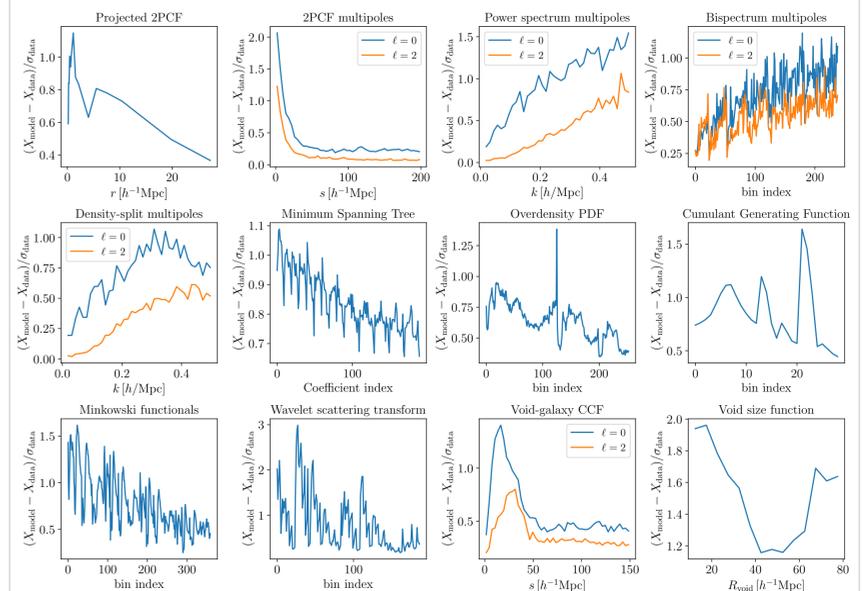
Constraints (preliminary)

- covariance is computed from 2000 small boxes (500 Mpc/h)
- Greedy combination:
 - combination of bins from all statistics that maximizes Fisher info
 - greedy algorithm
 - < 200 bins

DESI ACM topical group (in prep)



Emulator error



DESI ACM topical group (in prep)