

SAGE—MultiDark—TAO

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SAGE:

Semi-Analytic Galaxy Evolution

Croton et al., ApJS, 2016

<https://github.com/darrencroton/sage>

Primary goal:

Release a publicly available semi-analytic codebase that is ...

... fast, clean, modular

... easy to install and use

... can run on multiple simulations

Compared to Croton et al. 2006...

NEW! Gas cooling and AGN heating

NEW! Quasar mode feedback

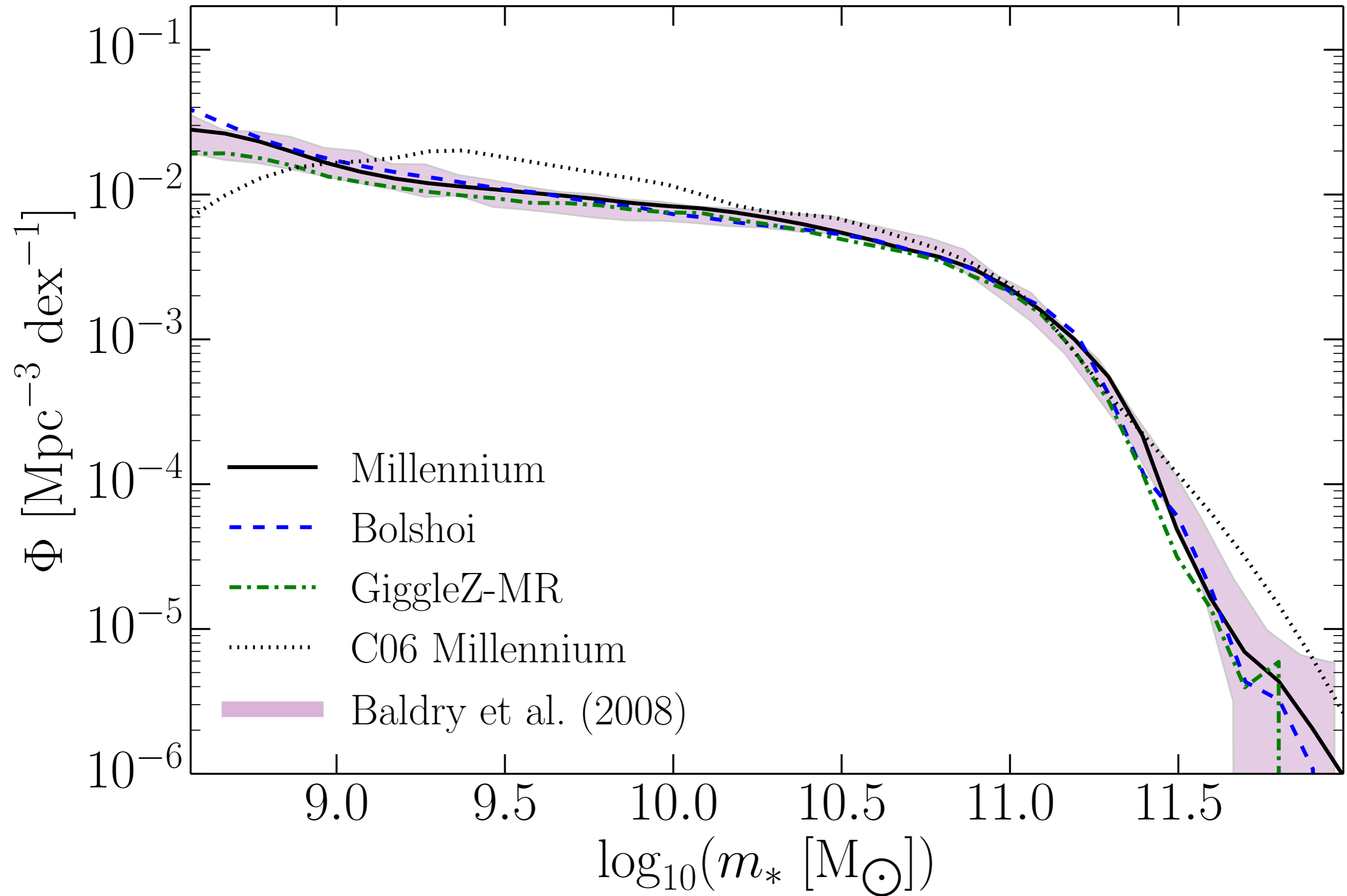
NEW! Ejected gas reincorporation

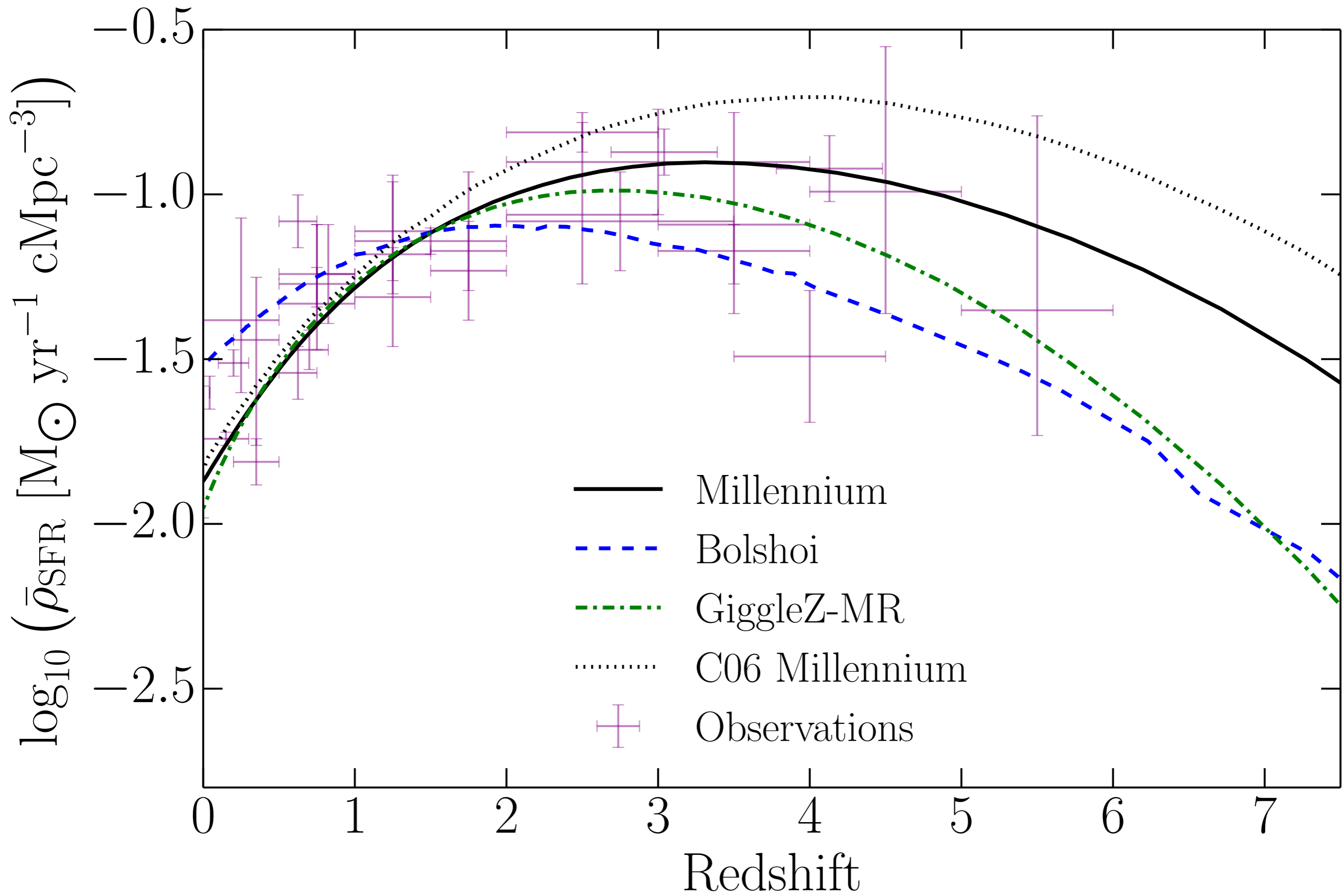
NEW! Satellite galaxies prescription

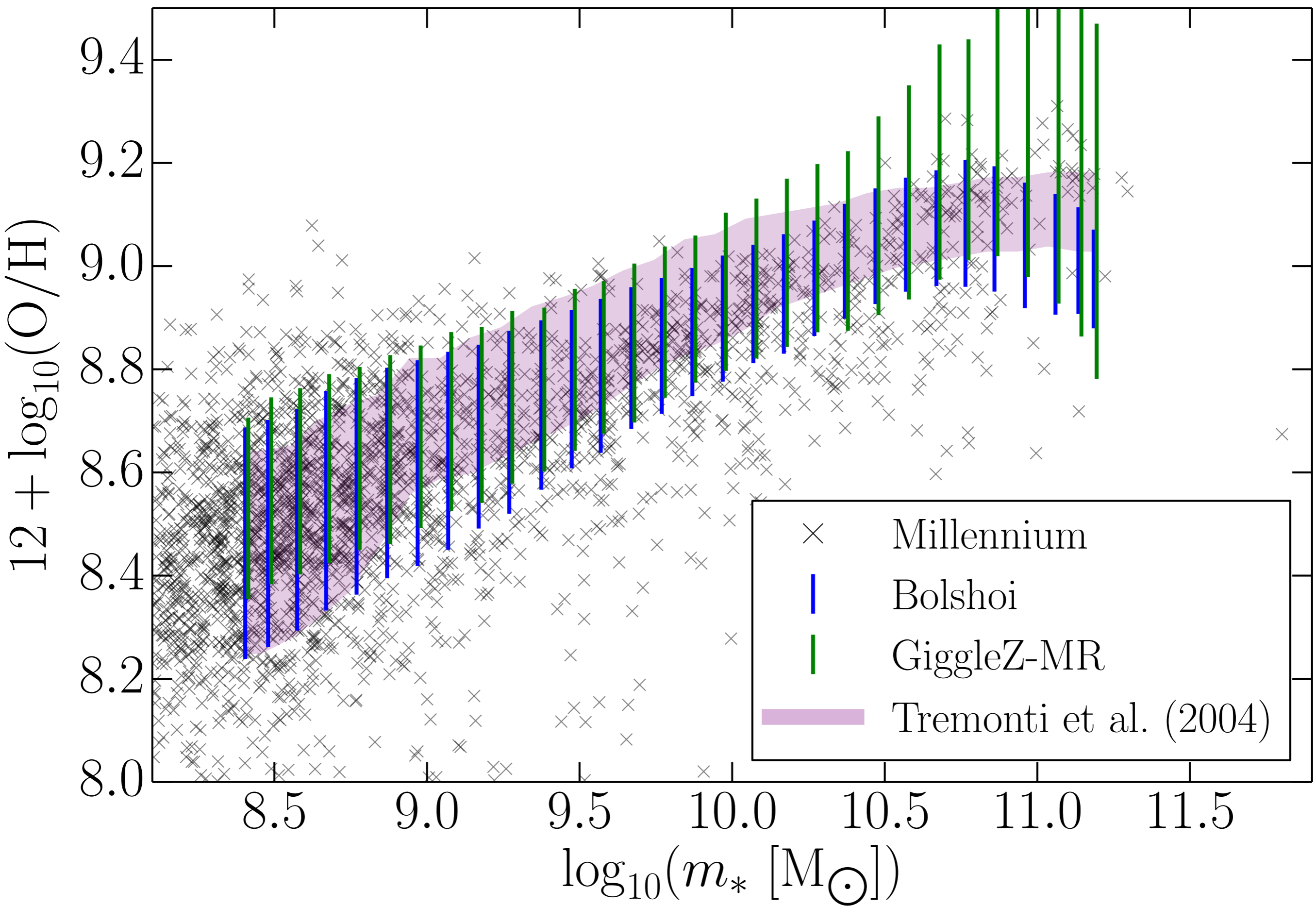
NEW! Mergers and intra-cluster stars

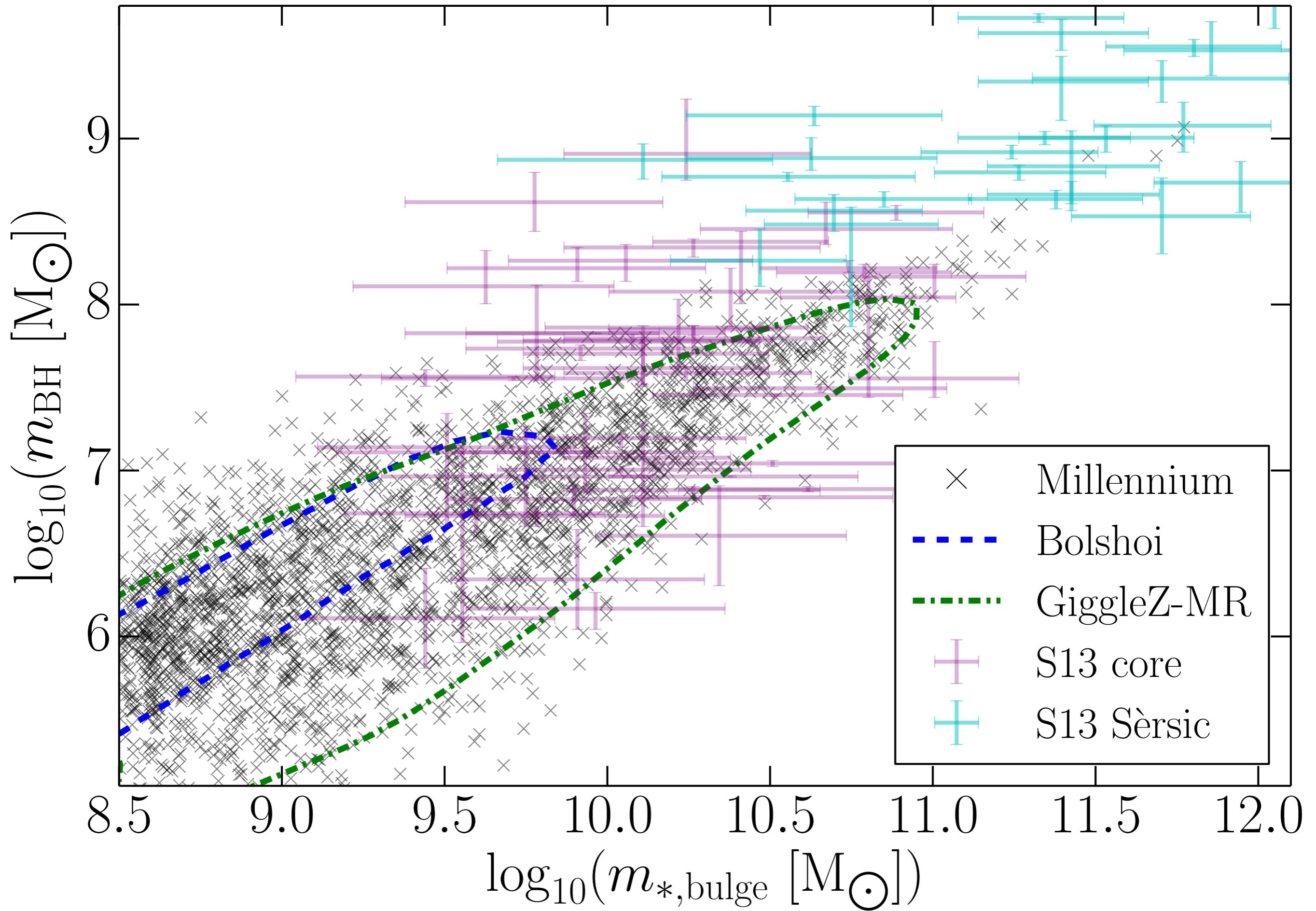
Simulation	N_{part}	$M_{\text{part}}h$ (M_{\odot})	$l_{\text{box}}h$ (cMpc)	Ω_M	σ_8	Code	Subhalo finder	Tree constructor
Millennium	2160^3	8.60×10^8	500	0.250	0.900	GADGET-2	SUBFIND	L-HALOTREE
Bolshoi	2048^3	1.35×10^8	250	0.270	0.820	ART	ROCKSTAR	CONSISTENT-TREES
GiggleZ-MR	520^3	9.50×10^8	125	0.273	0.812	GADGET-2	SUBFIND	Poole et al. (in prep.)

Parameter	Description	Value	C06 value	Fixed	Section(s)
$f_b^{(\text{cosmic})}$	(Cosmic) baryon fraction	0.17, 0.13	0.17	No	4, 5
z_0	Redshift when H II regions overlap	8.0	8.0	Yes	5
z_r	Redshift when the intergalactic medium is fully reionized	7.0	7.0	Yes	5
α_{SF}	Star formation efficiency	0.05	0.07	No	7
Y	Yield of metals from new stars	0.025	0.03	No	7
\mathcal{R}	Instantaneous recycling fraction	0.43	0.30	Yes	7, 8
ϵ_{disc}	Mass-loading factor due to supernovae	3.0	3.5	No	8
ϵ_{halo}	Efficiency of supernovae to unbind gas from the hot halo	0.3	0.35	No	8
k_{reinc}	Sets velocity scale for gas reincorporation	0.15	N/A	Yes	8
κ_{R}	Radio mode feedback efficiency	0.08	N/A	No	9.1
κ_{Q}	Quasar mode feedback efficiency	0.005	N/A	No	9.2
f_{BH}	Rate of black hole growth during quasar mode	0.015	0.03	No	9.2
f_{friction}	Threshold subhalo-to-baryonic mass for satellite disruption or merging	1.0	N/A	Yes	10
f_{major}	Threshold mass ratio for merger to be major	0.3	0.3	Yes	10









Branches under development...

Tonini et al: Bulge formation and demographics [accepted]

Stevens et al: Angular momentum in disks [submitted]

Raouf et al: Radio jets and radio AGN [draft]

Seiler et al: Diffuse gas and reionization [started]

<https://github.com/darrencroton/sage>

TAO:

Theoretical Astrophysical Observatory

Bernyk, Croton et al., ApJS, 2016

<https://tao.asvo.org.au>

Virgo - Millennium Database

Documentation

CREDITS/Acknowledgments

Registration

News

FAQ

Public Databases

+ DGalaxies

+ DHalotrees

+ Guo2010a

+ MField

+ MillenniumII

+ millimil

+ miniMilII

+ MMSnapshots

+ MPAGalaxies

+ MPAHaloTrees

+ MPAMocks

Private (MyDB) Databases

darren_db (rw) (context)



Welcome Darren Croton.

Streaming queries return unlimited number of rows in CSV format and are cancelled after 420 seconds.

Browser queries return maximum of 1000 rows in HTML format and are cancelled after 30 seconds.

Query (stream)

Query (browser)

Help

Maximum number of rows to return to the query form:

Demo queries: click a button and the query will show in the query window.

Holding the mouse over the button will give a short explanation of the goal of the query. These queries are also available on [this page](#).

Mainly Halos:

Mainly Galaxies:

Metadata queries: The SQL statements under these buttons provide examples for querying and managing the state of a private database. Holding the mouse over the button will give a short explanation of the goal of the statement.

ShowTables

Show Views

Show Columns

Show Indexes

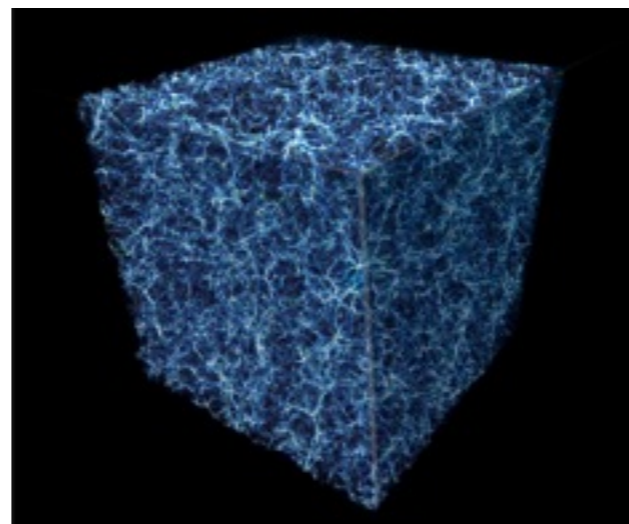
MyDB Size

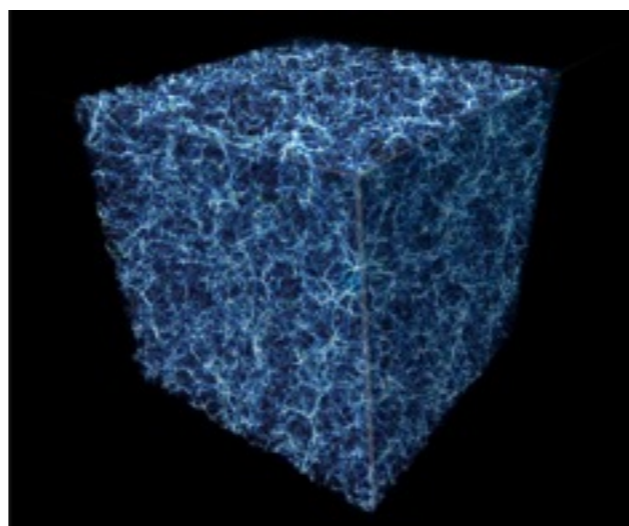
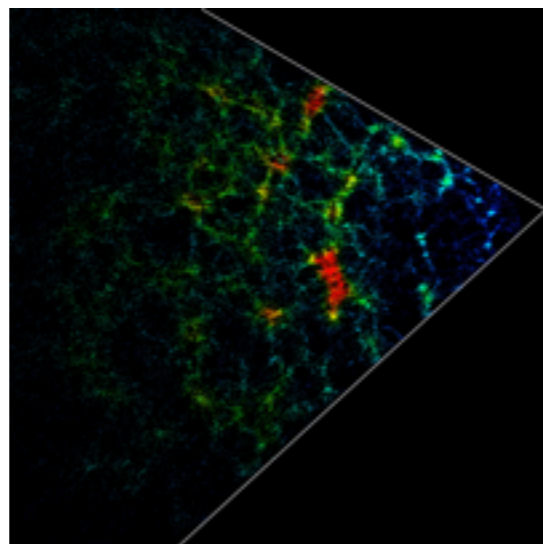
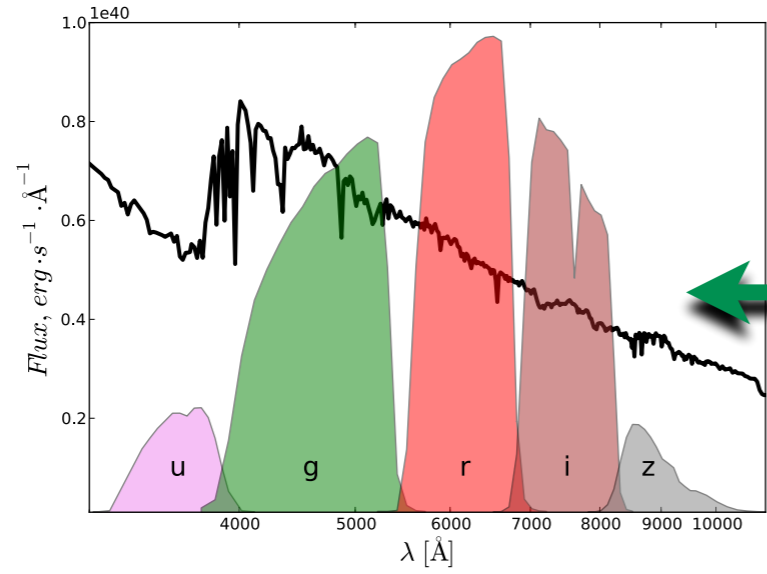
MyDB Table Size

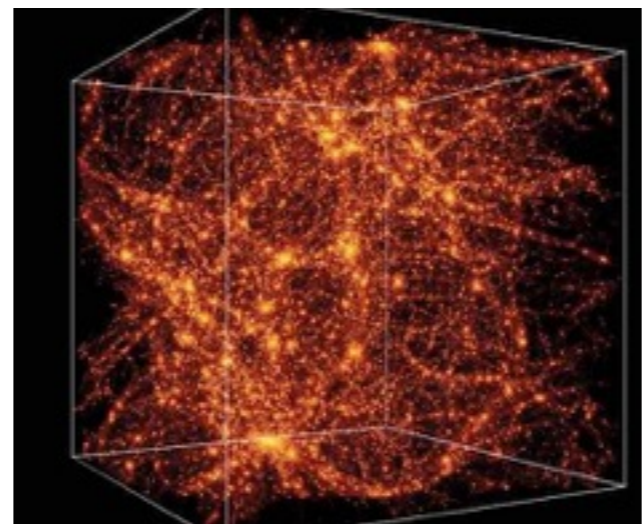
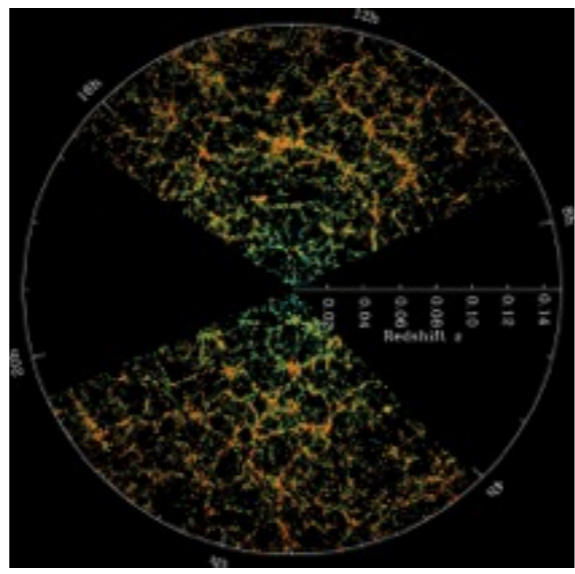
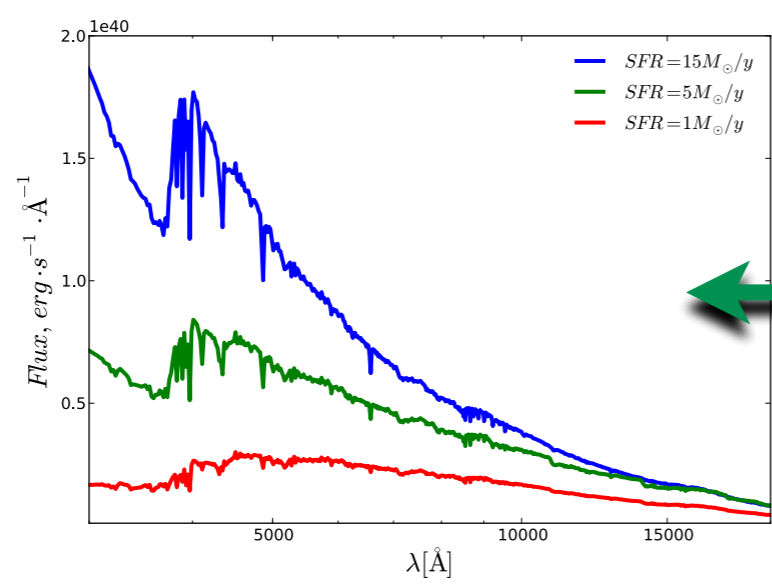
Create View

Drop Table

Create Index







TAO

Telescope simulator

Image generation

Light cone generation

SEDs + Filters

Web form data query

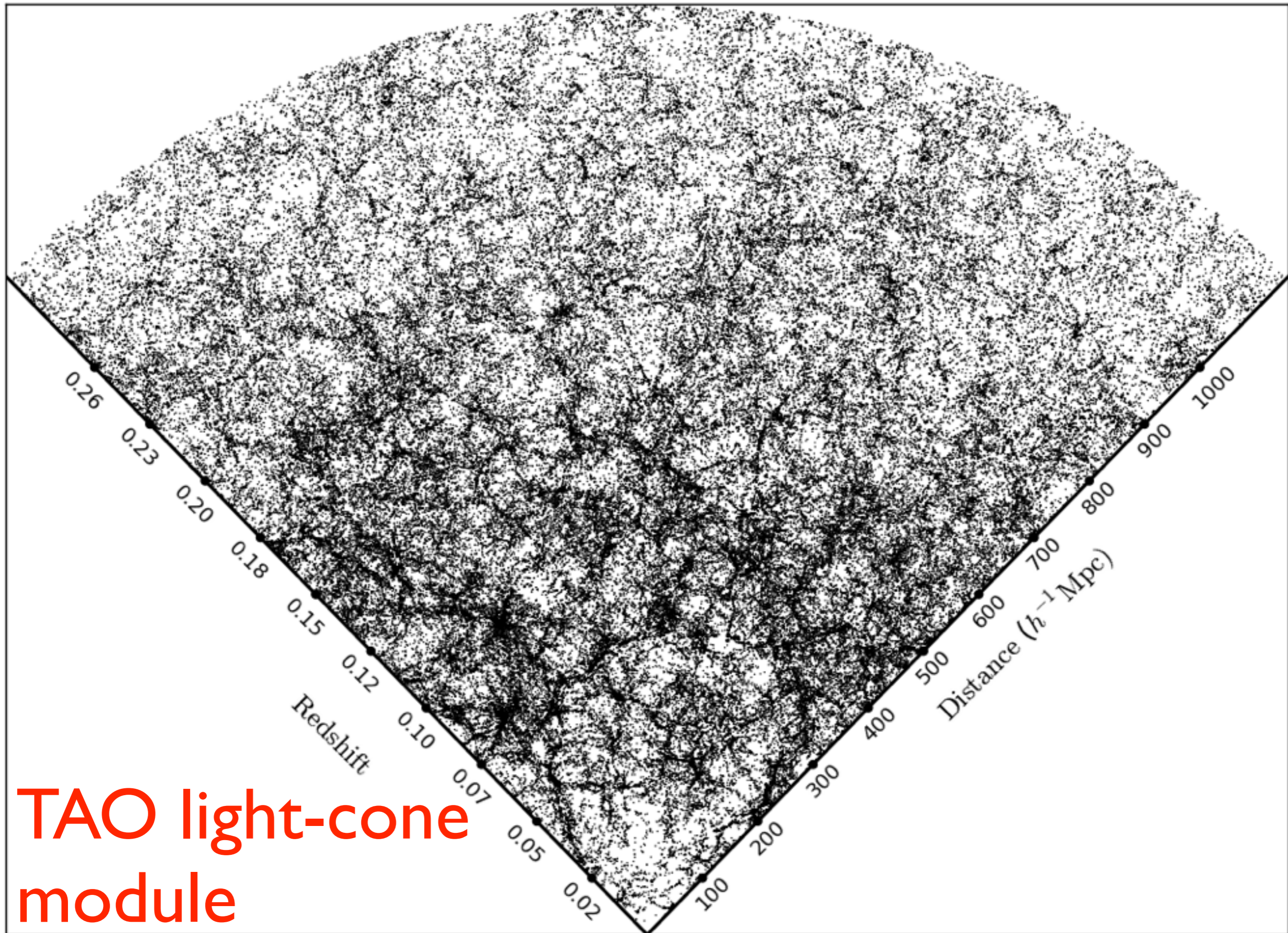
Simulation database

GAVO

SQL data query

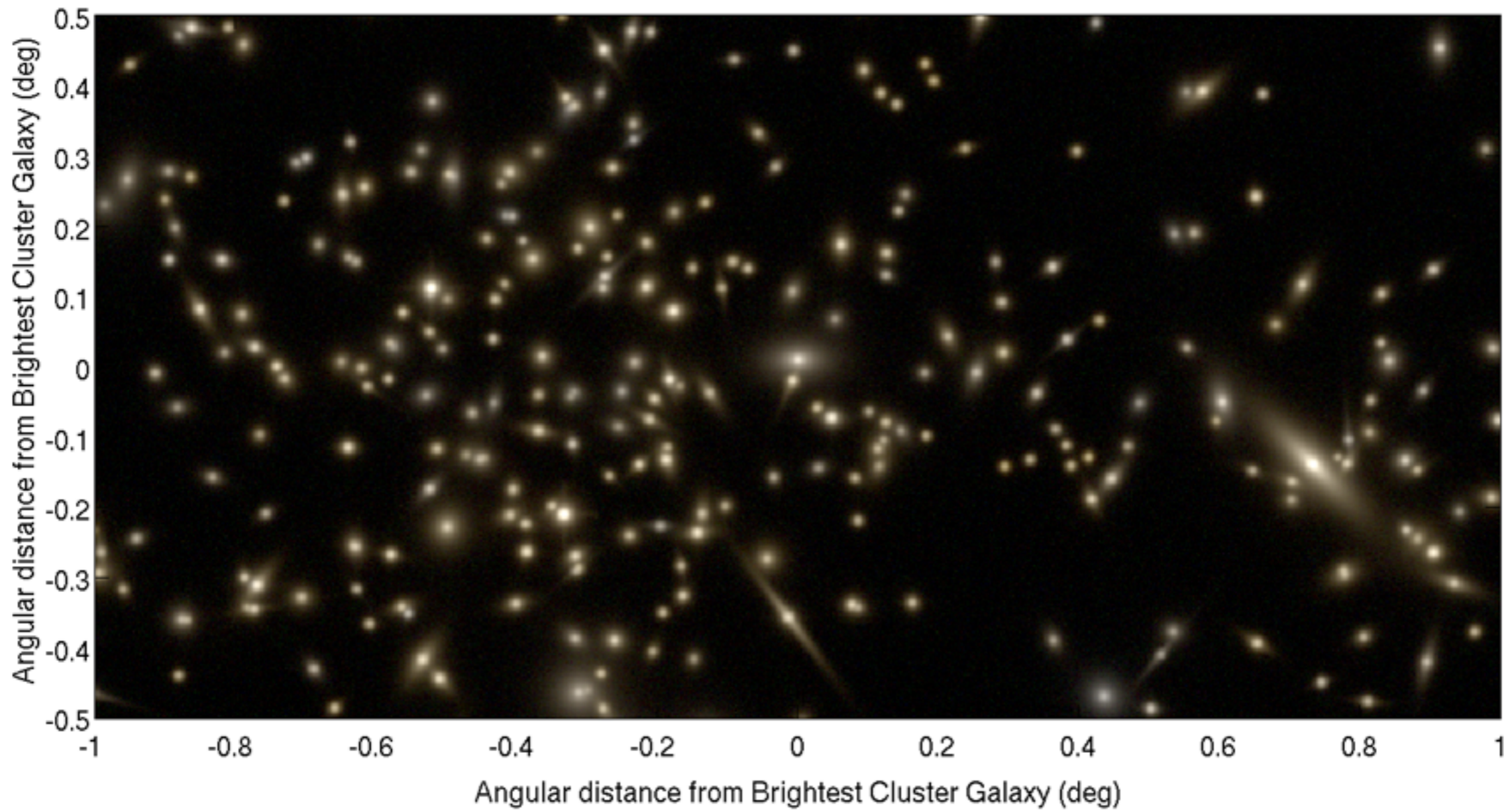
Simulation database

<https://tao.asvo.org.au>



**TAO light-cone
module**

TAO image module



TAO development timeline...

More simulations and models [current]

 Data import tools [advanced]

Hydrodynamic simulation data [started]

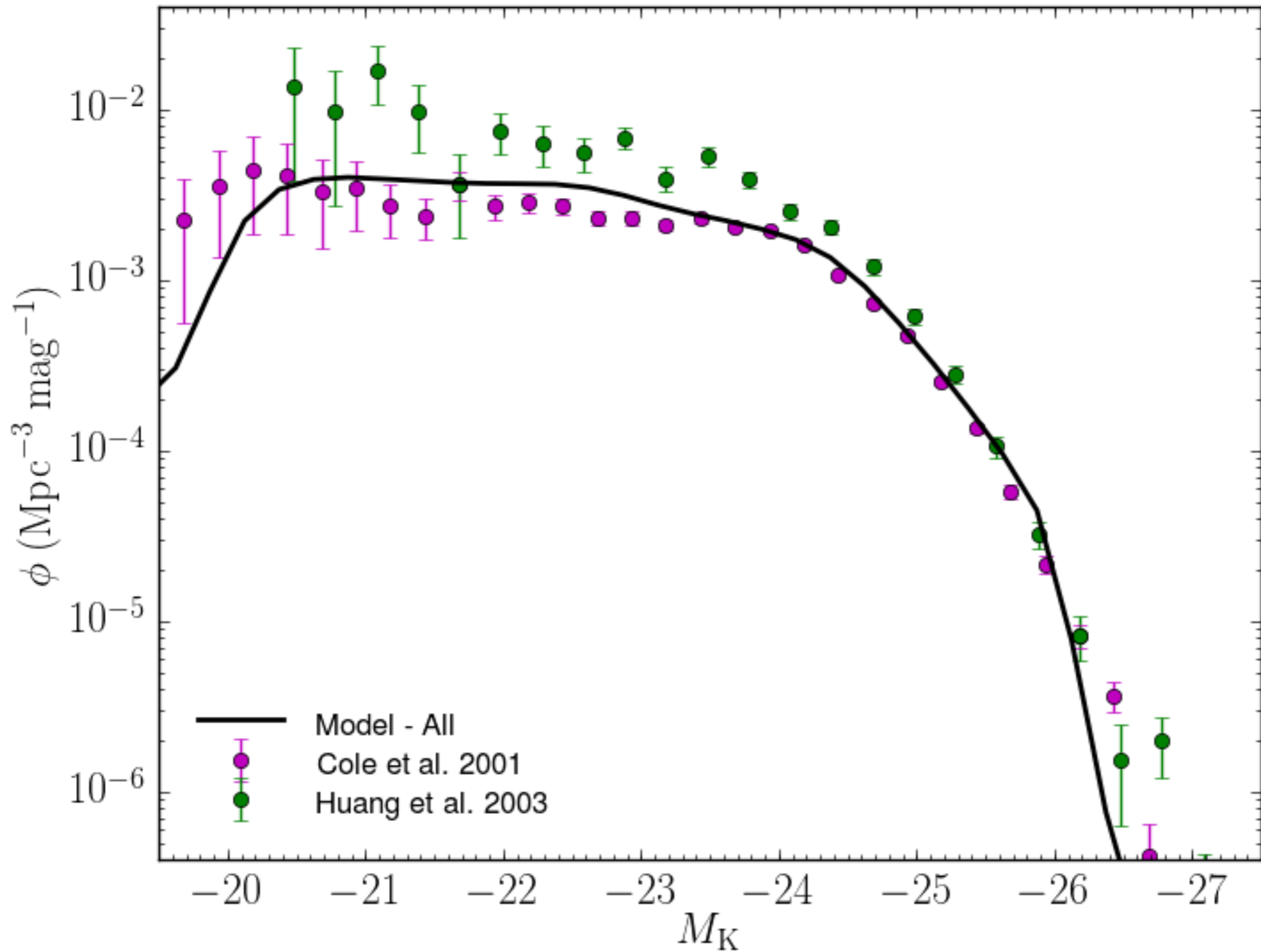
TAOcom: Command line TAO [started]

 TAO for Teams [funded]

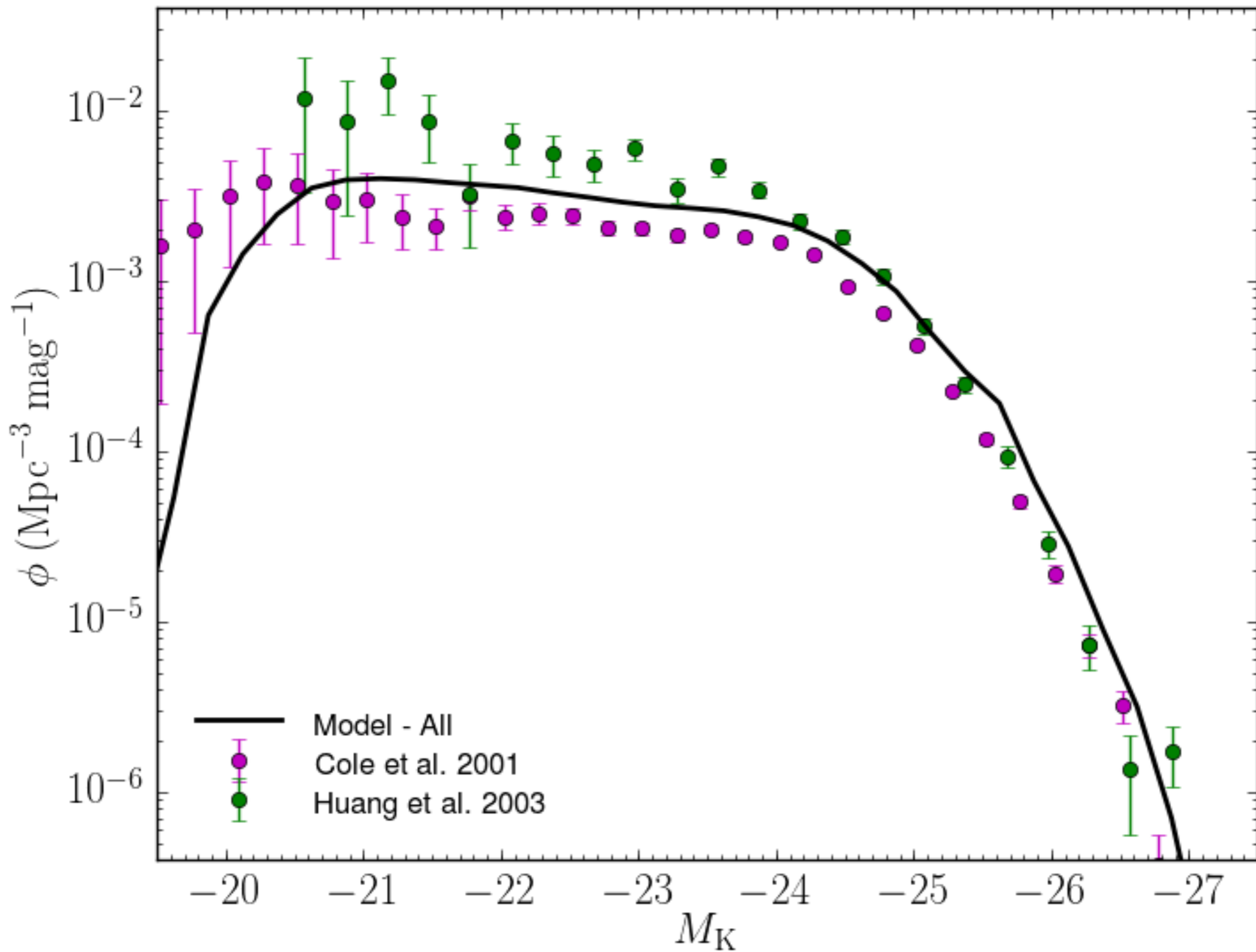
Real-time image generation [planning]

<https://tao.asvo.org.au>

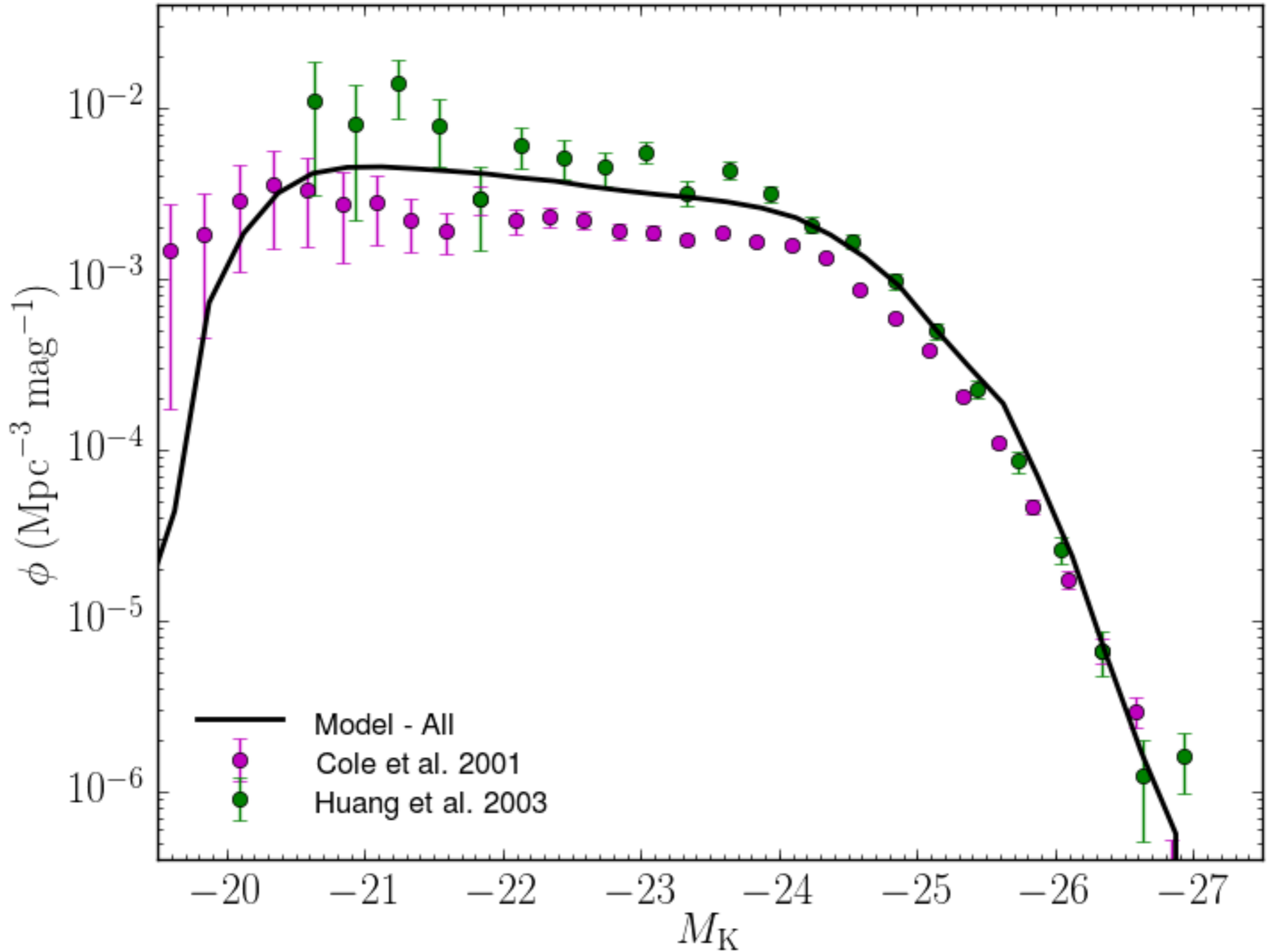
SAGE/Millennium



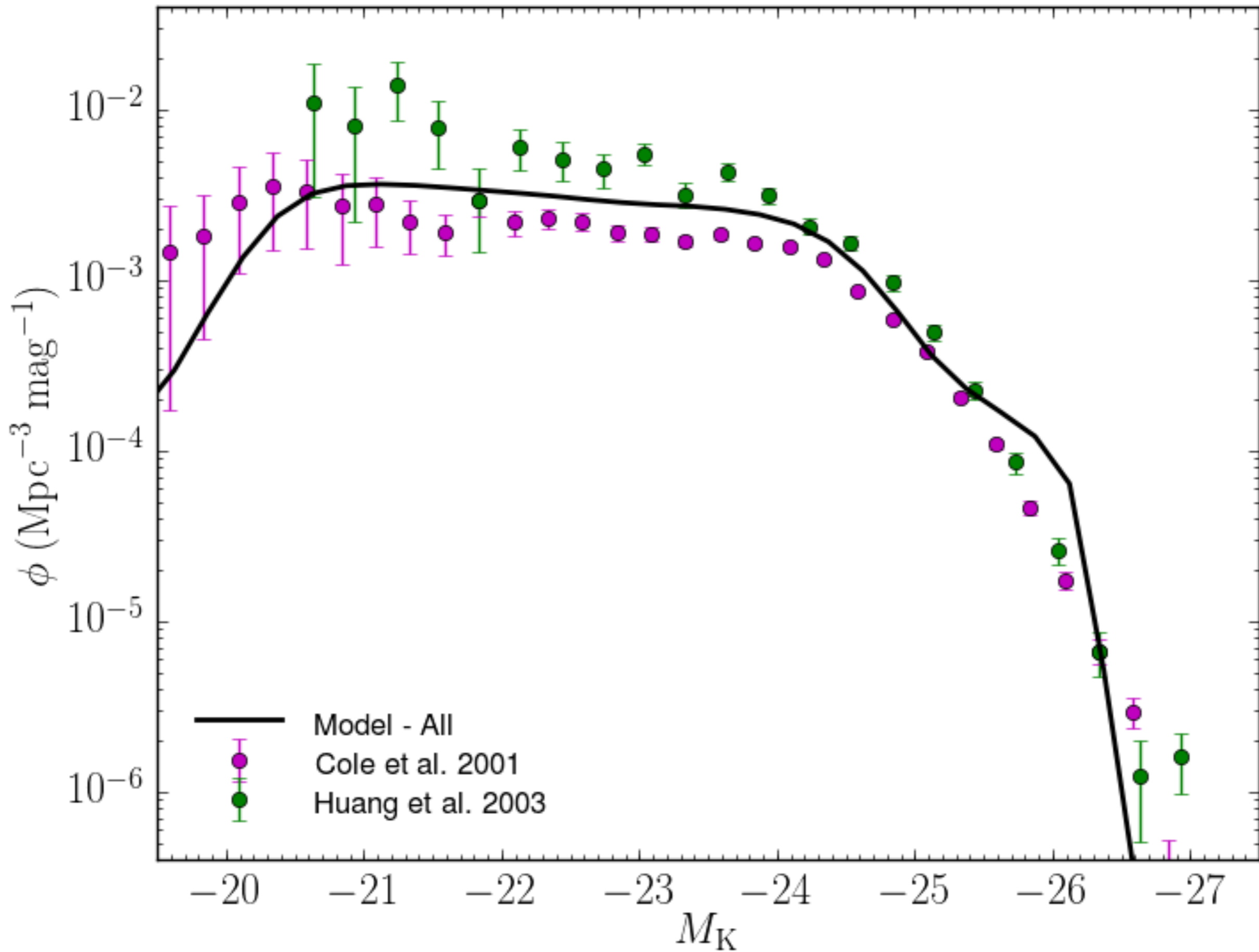
SAGE/Bolshoi



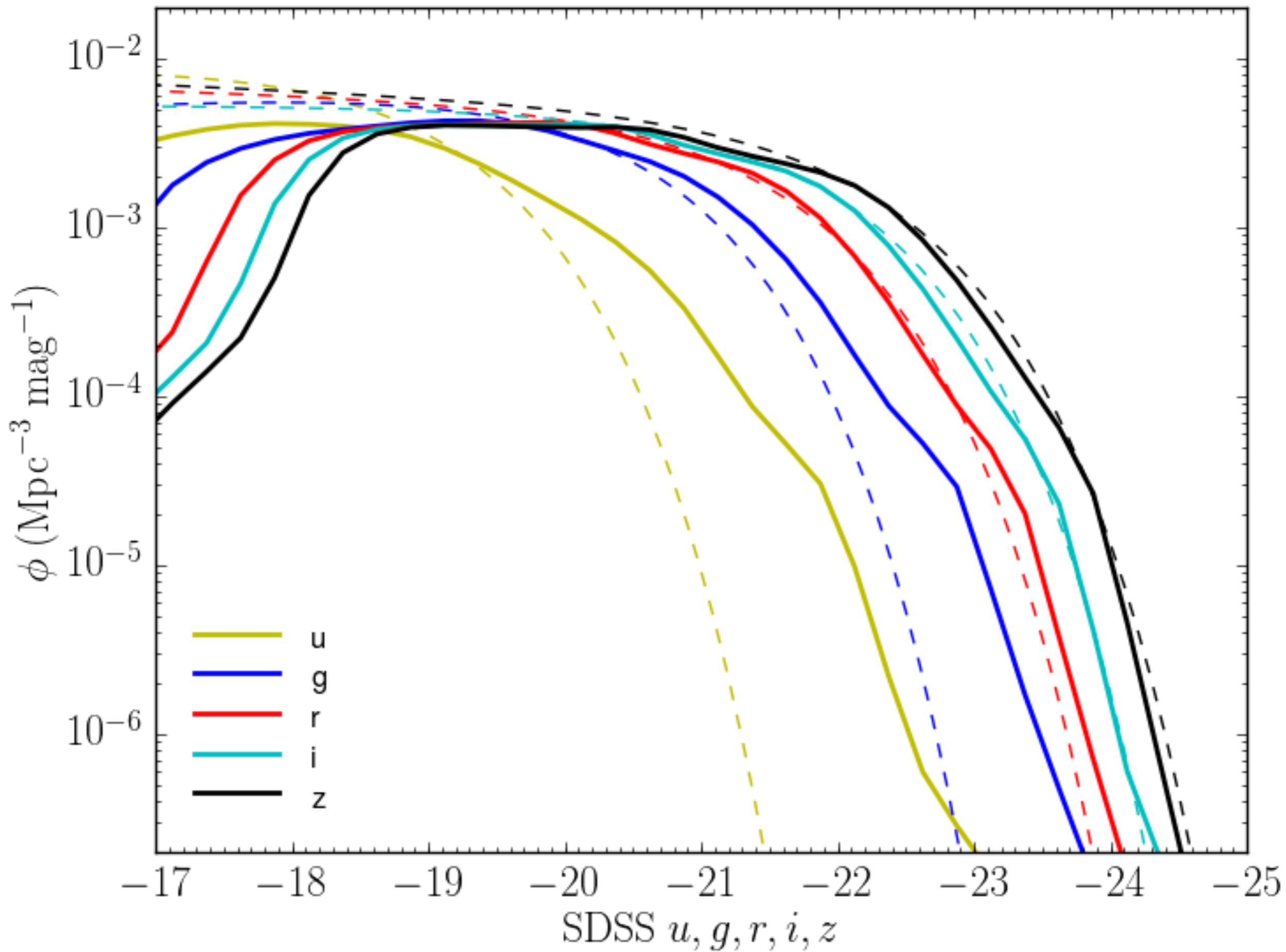
SAGE/Bolshoi (Planck)



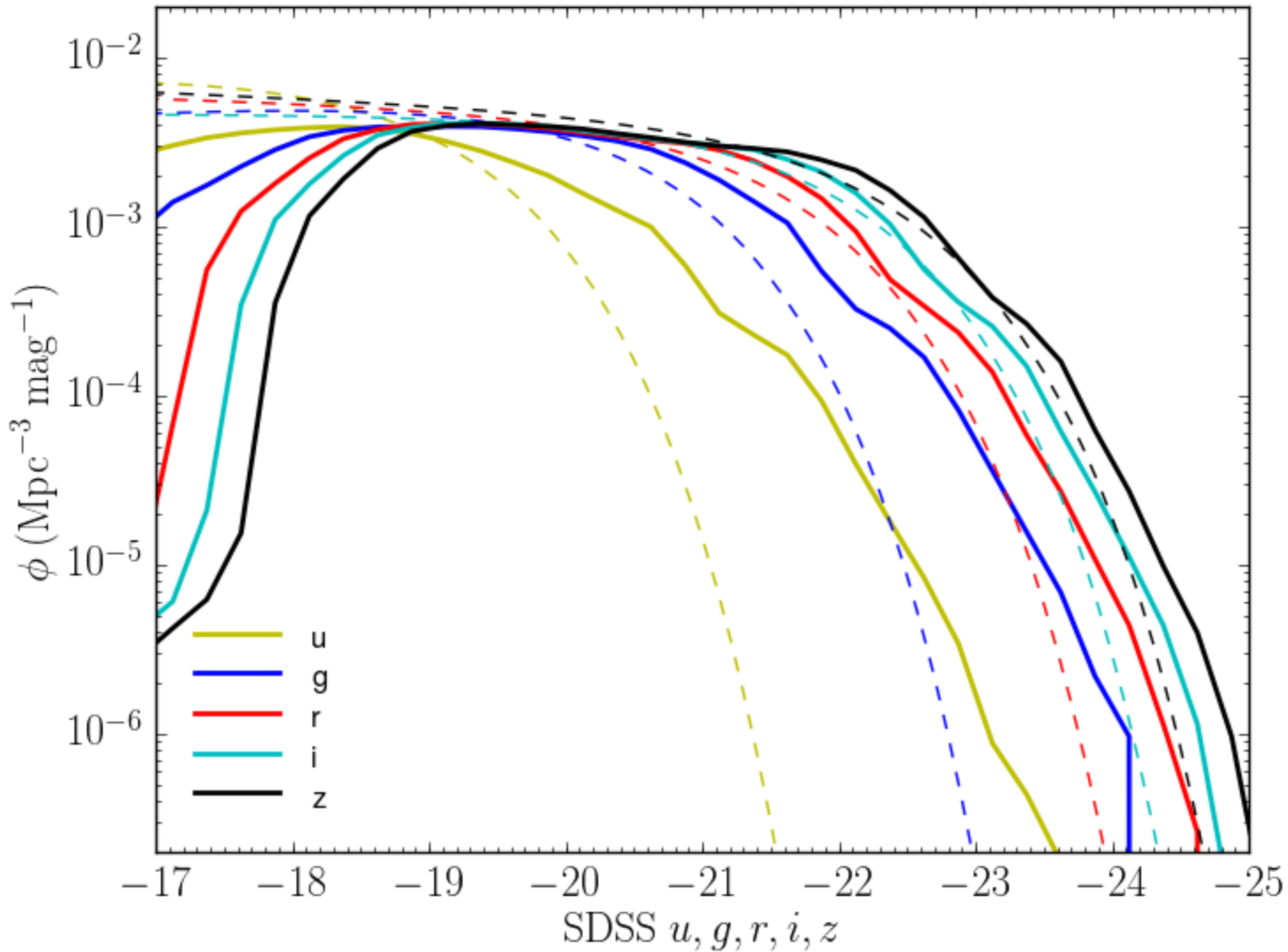
SAGE/MultiDark



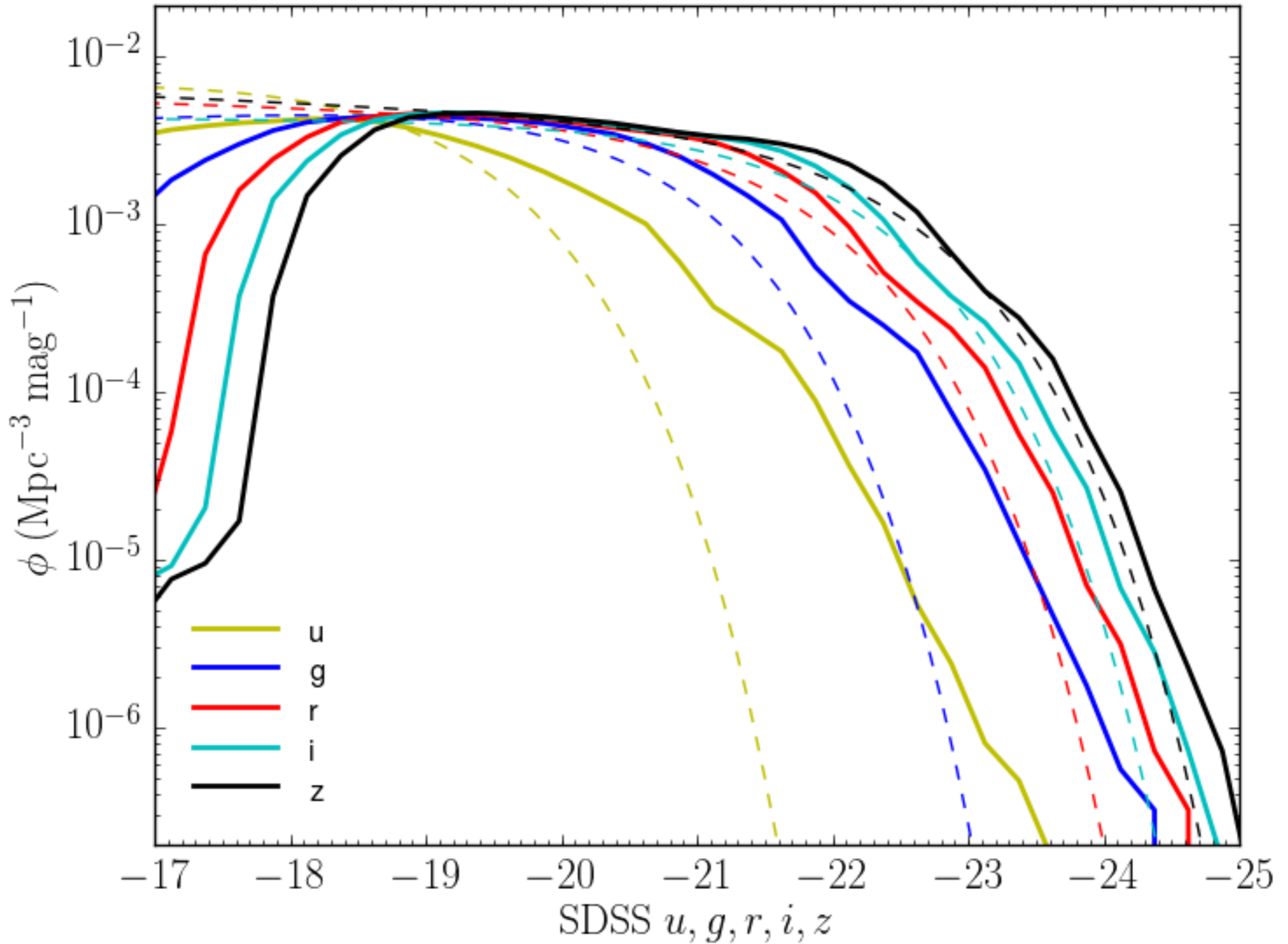
SAGE/Millennium



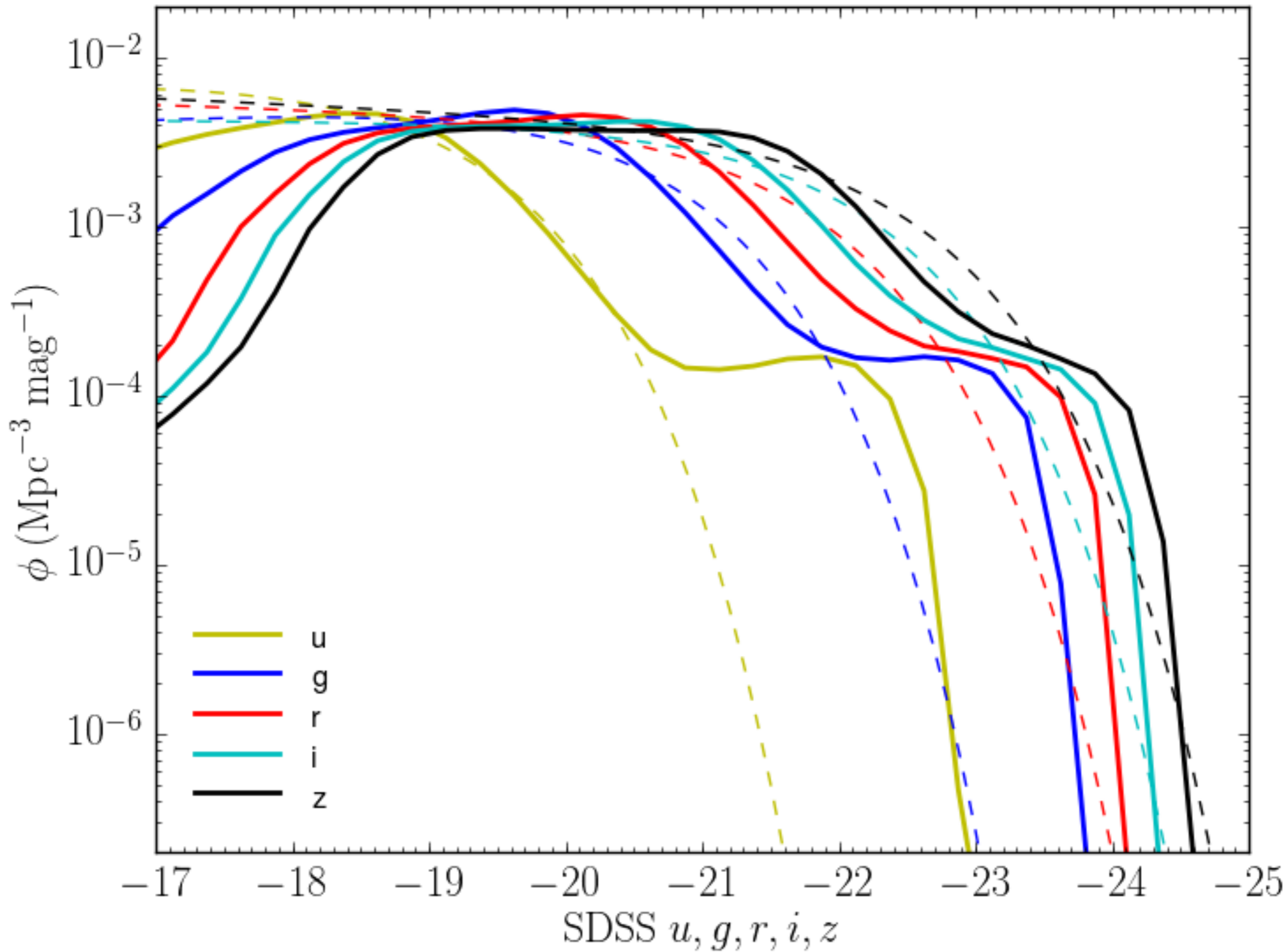
SAGE/Bolshoi



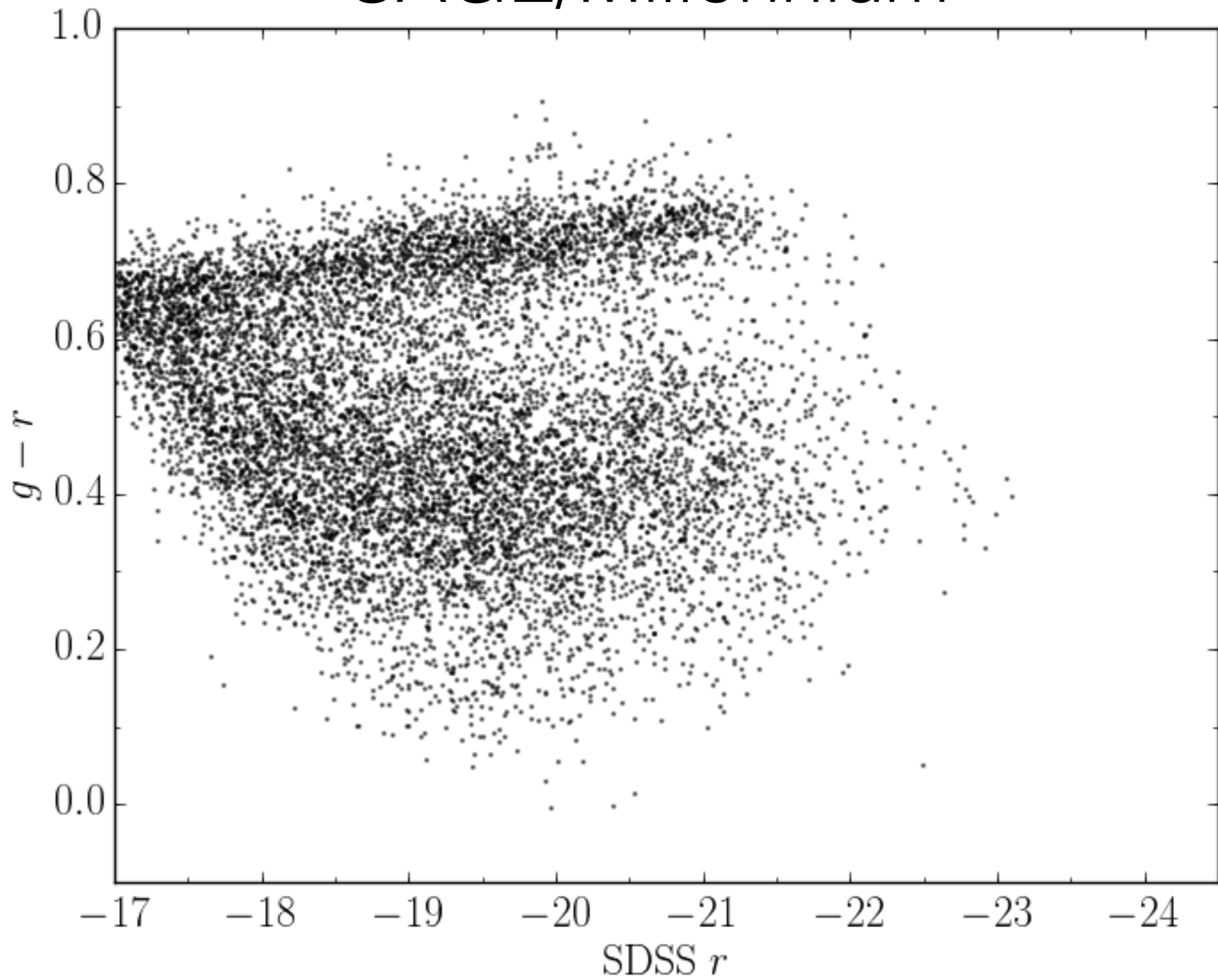
SAGE/Bolshoi (Planck)



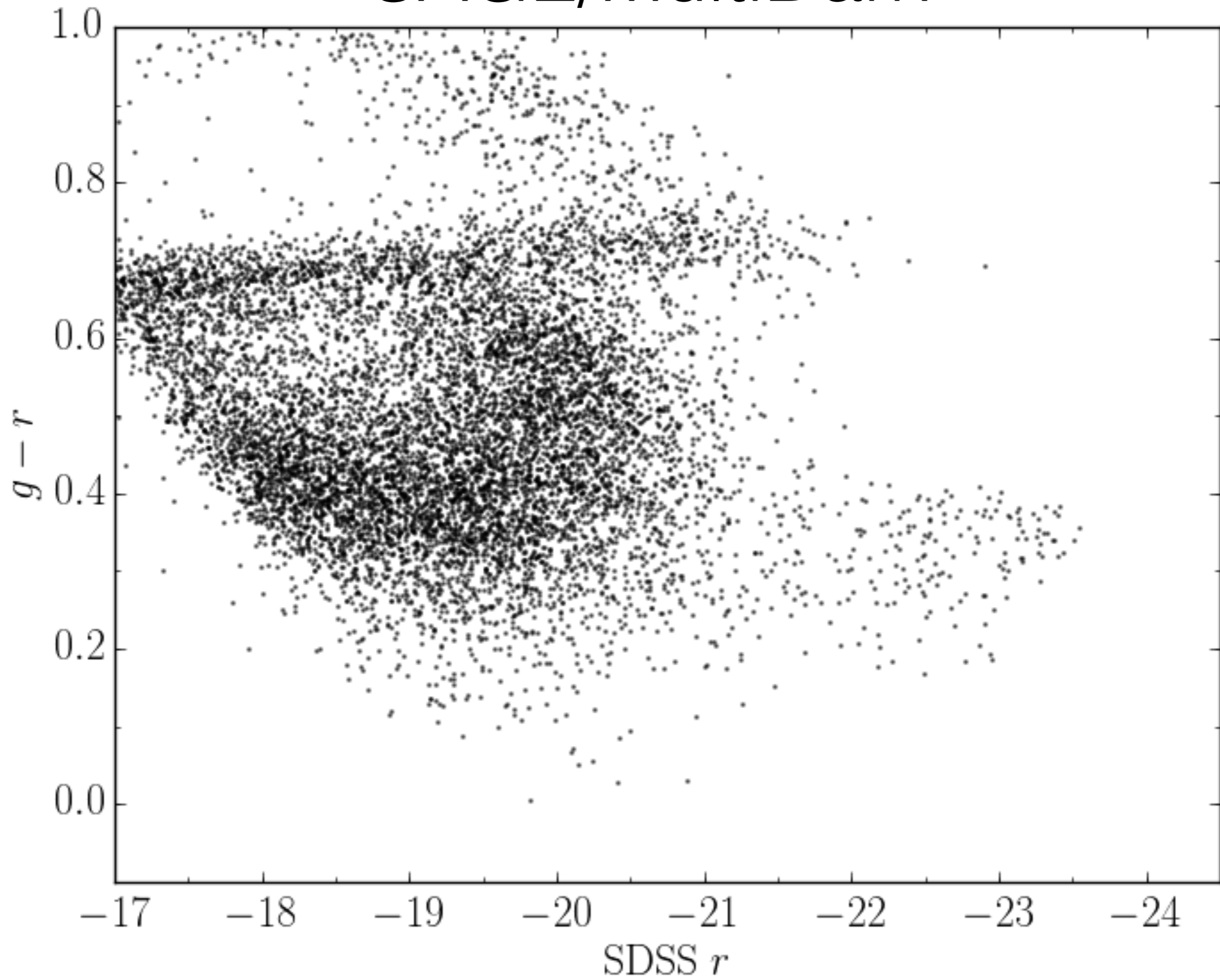
SAGE/MultiDark



SAGE/Millennium



SAGE/MultiDark



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<http://tao.asvo.org.au>

<http://www.asvo.org.au>

<https://www.nectar.org.au/all-sky-virtual-observatory>