Summary of Spherical & Triaxial Working Group

Goals

1) Realistic mocks for general community

2) Accuracies of mass/orbit modeling methods for dwarf spheroidals pre- & post-GAIA

Participants

Justin READ, Surrey — *Leader*, Mocks & GravImage Jeans method

Matt WALKER, Carnegie-Mellon — Mocks & Jeans methods

Jorge PEÑARRUBIA, Edinburgh — Mocks

Gary MAMON, IAP, Paris — MAMPOSSt method

Laura WATKINS, STScI — Jeans method

Payel DAS, Oxford — DF of actions method

Mao-Sheng LIU, CMU — Support Distribution Machine method

Absent but provided some analyses:

John MAGORRIAN, Oxford — DF of actions & orbit-modeling methods

6D Mocks

all assume negligible mass for stellar component

8 + 4 +2 Spherical *Walker & Peñarrubia*

8+2 based on analytical distribution function
from isotropic or Osipkov-Merritt (OM) velocity anisotropy
4 based on Made-to-Measure (see Triaxial)
Cuspy (NFW) or Cored potentials
Cuspy (general Plummer) or Cored (~ Plummer) tracers
Last 2 come with subpopulation info

2 Triaxial *Dehnen & Wilkinson*

based on Made-to-Measure ~ N-body code
Cuspy (NFW) or Cored potentials; Cored (Plummer) tracers

4 Tidally Stripped *Read*

based on N-body code of dwarf orbiting MW-like potential
Orbits of different pericenters, traced at fixed time
Cuspy (NFW) or Cored potentials; Cored (Plummer) tracers

Unique 6D samples

for all data sets :
- 20 subsamples of *N*=10000, 1000 (5x) & 100 (10x) stars
- without or with 2 km/s velocity erroros

J. Read, this workshop

→ 20x2x[(8+4)+2+4] = 720 6D mocks

Projected mocks

2+1D (sky position & LOS velocity)
& 5D (sky position, LOS & POS velocities)

3 or 4 viewing axes (principal plus intermediate for Triaxial)

→ 20x2x[3x(8+4+2)+4x2+3x4] = 2480 projected mocks!

Methods

Method	Person / Reference	Input	Assumptions	Speed	Cases run
Jeans	Walker / Strigari+07	Discrete LOS	Gaussian LOS velocities	Very fast	
MAMPOSSt	Mamon+13	Discrete LOS	Gaussian 3D velocities	Intermediate	~ 600
Watkins	Watkins+13	Discrete LOS +POS	Gaussian 3D velocities	Intermediate	~ 10
parametric Action	Das+15	Discrete LOS +POS	DF = *f*(Actions)	Intermediate	
GravImage	Read & Steger	Binned LOS surf. dens. + vel. disp.		Slow	(~10)
Orbit modeling	Magorrian	Discrete LOS +POS		Very slow	1
DPM	Magorrian 14	Discrete LOS +POS	DF=non-parametric mixture of actions	Very slow	1
Support Dist. Machine	Liu / Ntampaka+15	Discrete LOS	(supervised on mocks)	Very slow	

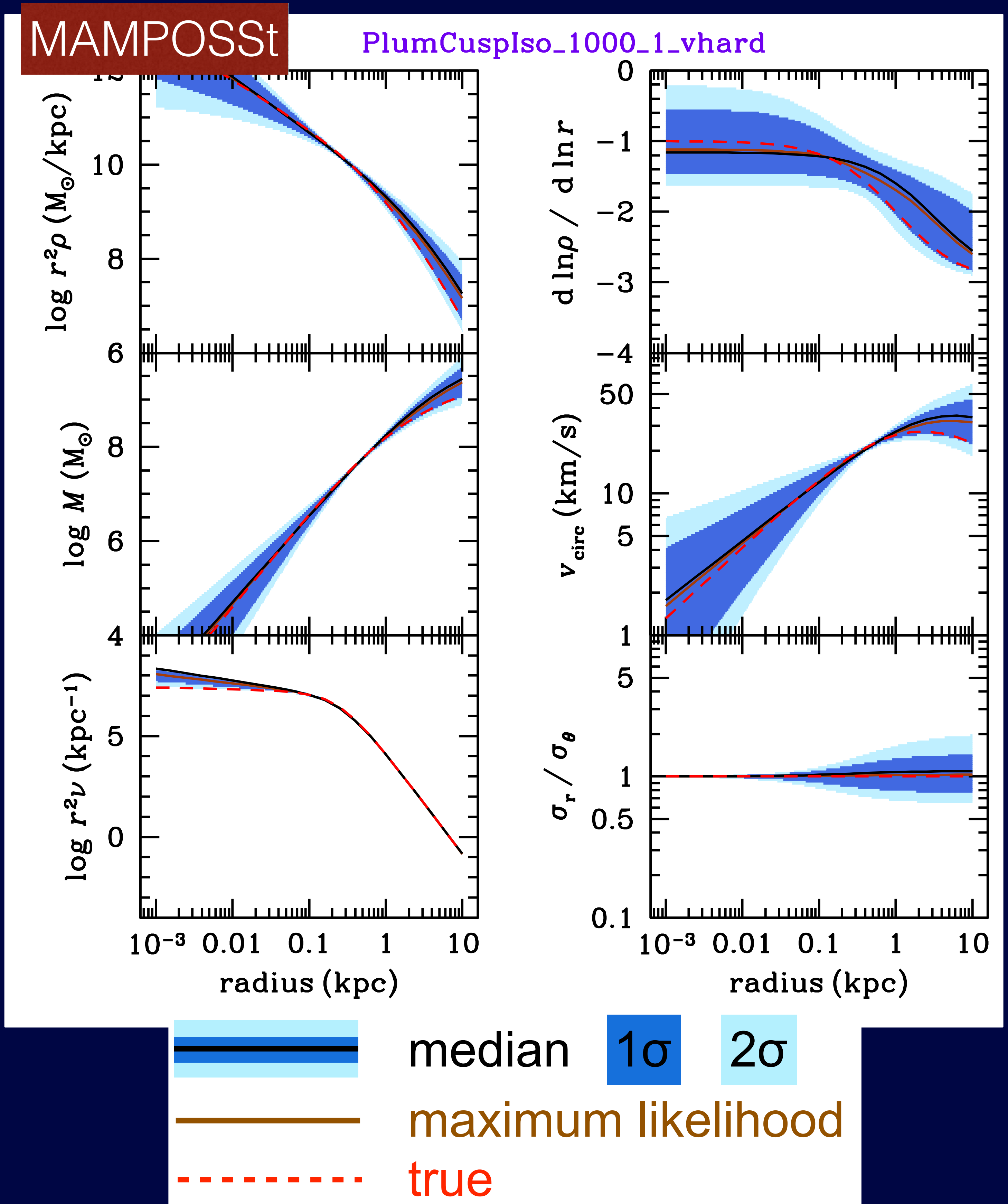
Physical outputs

radial profiles of
- tracer density
- velocity anisotropy
- DM mass
- DM density
- DM slope

projected radial profiles of
- tracer surface density
- LOS velocity dispersion

median, 1-2 equiv σ
MLE?

parameters?
- inner DM slope?
- effective radius of tracer?



Progress

- Mocks now sampled
- New person(s) should join
- Paper drafting has begun

Aim: submission before end of year

4th Challenge

- Milky Way foreground
- unknown populations