Is SAM predicted MW satellite LF consistent with a Poisson distribution?

Report Spam

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My previous tests show the variance of the SAM predicted MW satellite LF is consistent with a Poisson distribution. It is interesting to know if the higher order moments of the predicted LF show the distribution is inconsistent with Poisson. I apply my SAM on 38 simulation merger trees of MW halos, and compute the 2-4th order moments of each luminosity bin of the predicted LF. I compare the SAM predicted moments with Poisson moments. Because I have a finite number of merger trees in my SAM simulation, I want to understand if the deviation of the SAM predicted statistics from Poisson is statistically significant to indicate the predicted LF does not follow a Poisson distribution. The way I test it is the following. I generated 10000 Monte Carlo samples of 38 Poisson distributed LFs. The expectation of each Monte Carlo LF takes the value of the mean of the 38 SAM predicted LFs. I then calculated 10000 values of a given statistics using each 38-LF sample. I used these 10000 values to construct reference distributions and to compute the mean and the standard deviation. The Monte Carlo simulations indicate that the higher moments are still consistent with Poisson.

column 1: bin
column 2: Moment ration: M_sam/M_poisson
column 3: square root variance of the moment ratio

2nd-moment

0	0.883721	0.540275
1	0.916512	0.407922
2	1.05556	0.345313
3	1.12366	0.312790
4	1.28126	0.279366
5	1.30225	0.261591
6	1.20909	0.243202
7	1.17214	0.216100
8	1.05901	0.191099
9	1.06680	0.167298
10	1.00336	0.143673
11	0.997498	0.126044
12	0.996345	0.112168
13	1.01443	0.0975529
14	1.02106	0.0881718

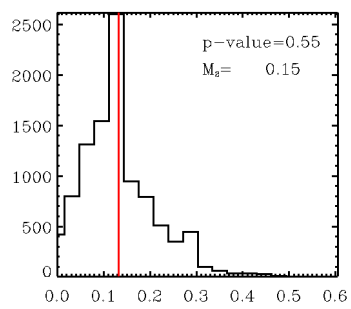
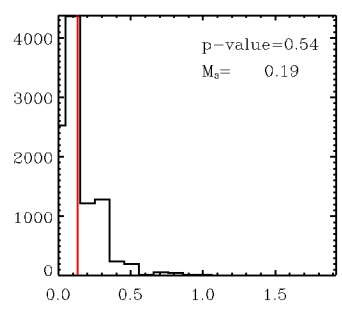
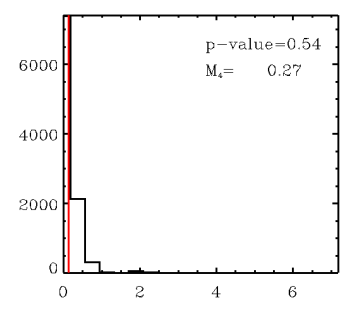
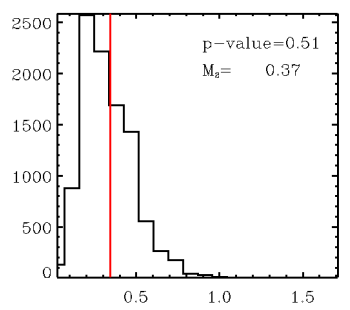
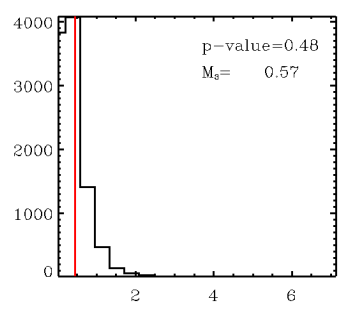
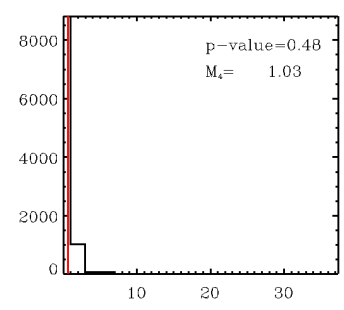
3rd-moment

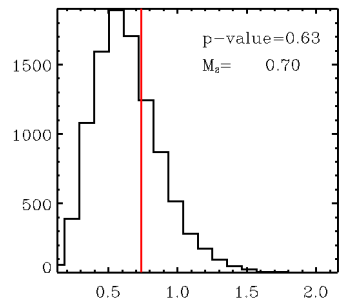
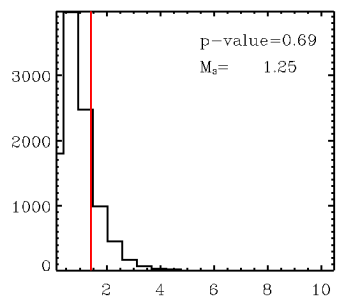
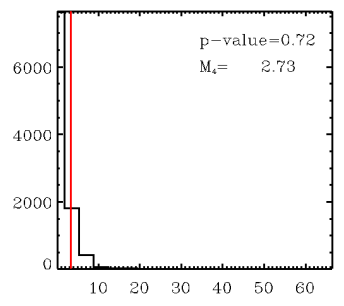
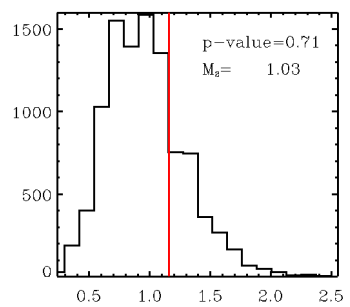
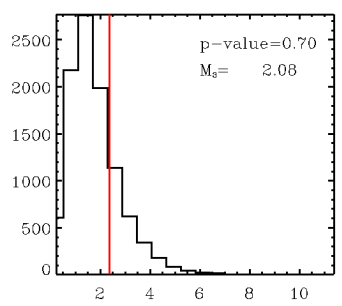
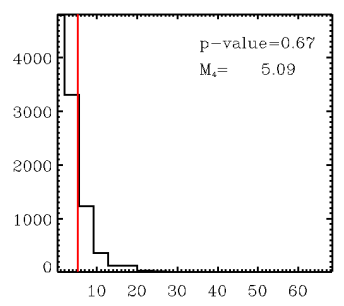
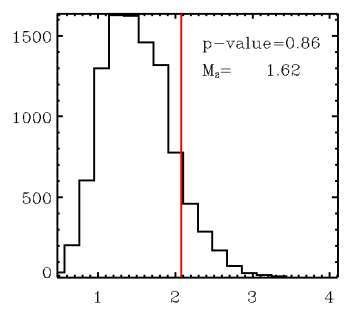
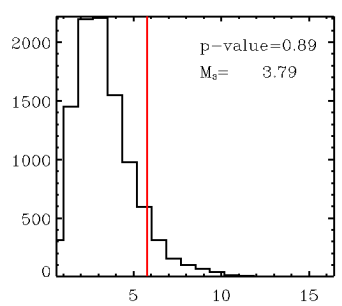
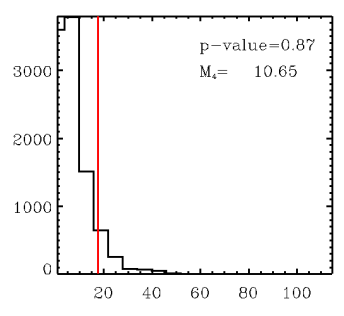
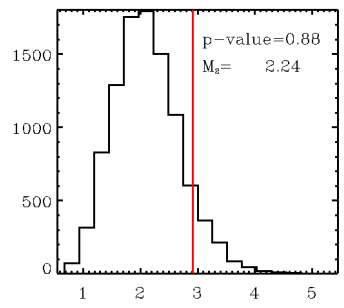
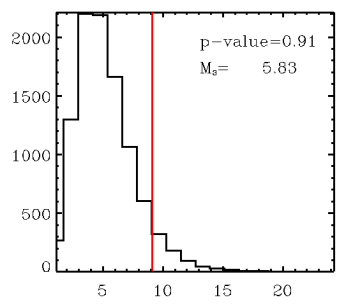
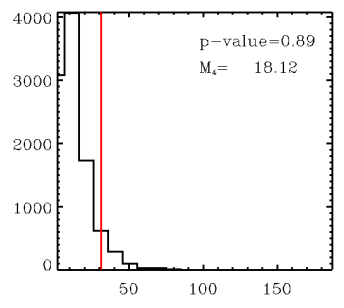
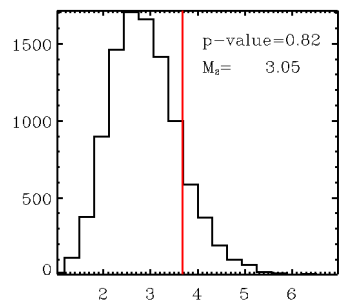
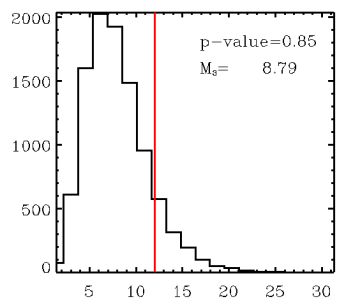
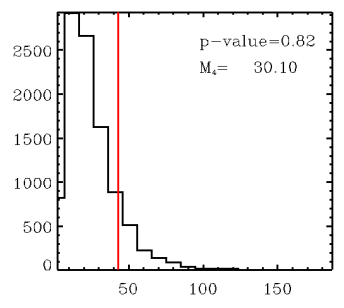
0	0.708190	0.803404
1	0.791641	0.659060
2	1.13403	0.563336
3	1.13856	0.505151
4	1.52230	0.448946

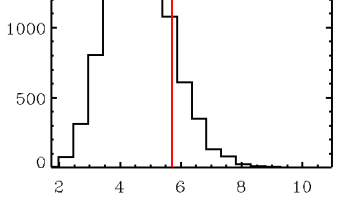
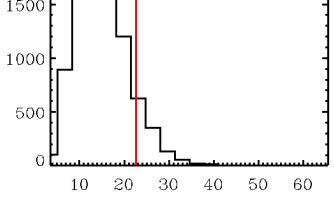
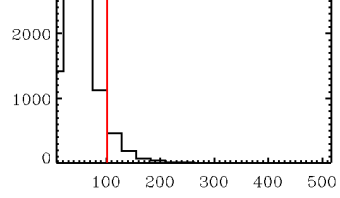
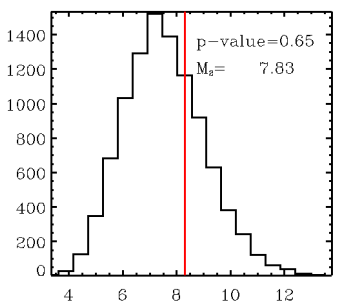
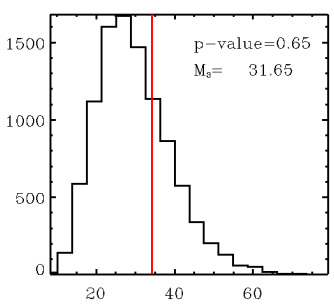
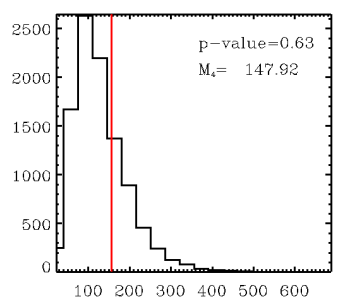
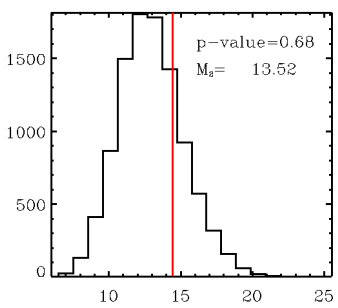
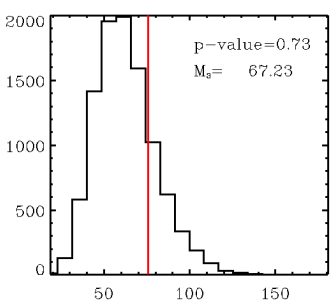
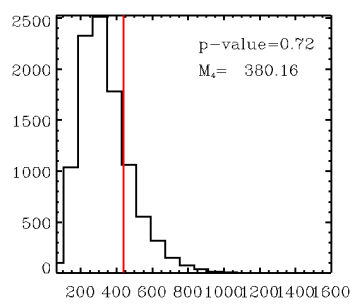
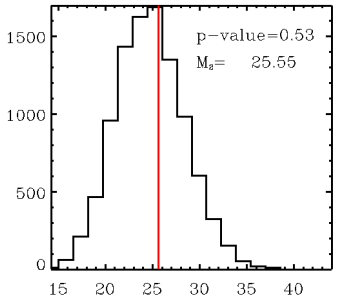
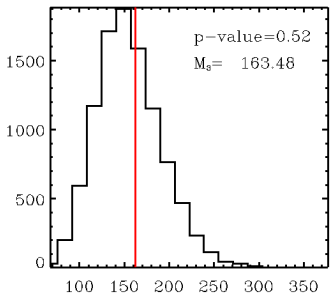
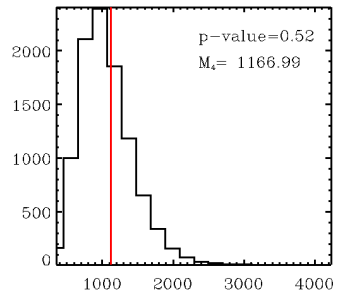
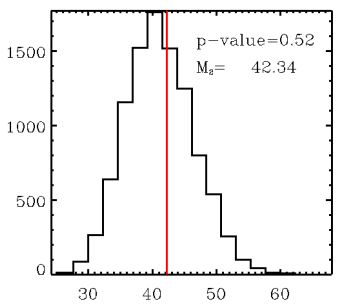
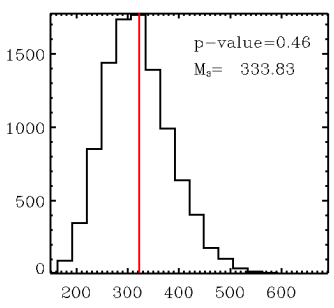
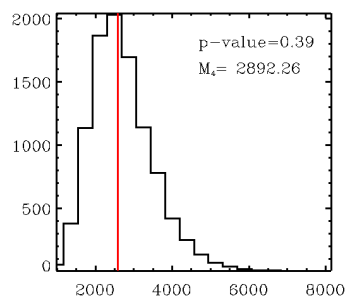
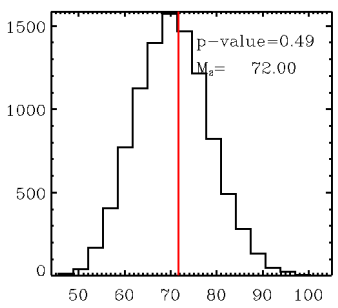
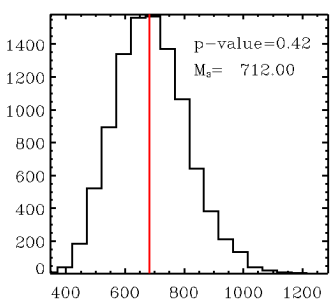
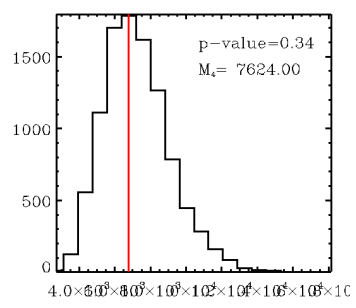
5	1.56702	0.420933
6	1.37153	0.388615
7	1.36419	0.342030
8	1.08187	0.300304
9	1.12583	0.261363
10	0.990917	0.222383
11	0.963537	0.195132
12	0.959048	0.171850
13	1.00227	0.149069
14	1.02945	0.134342

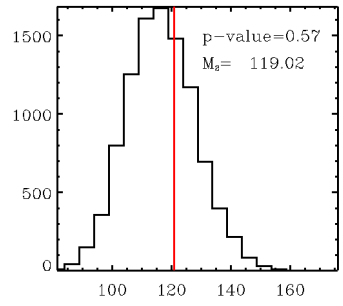
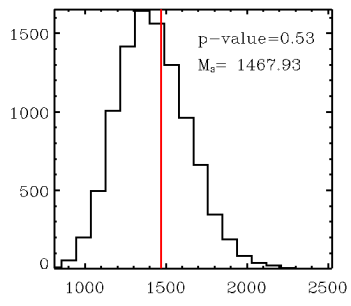
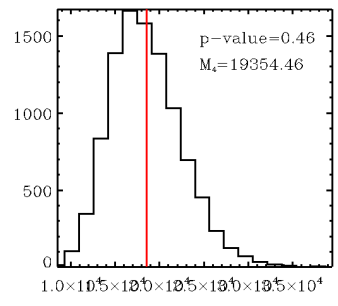
4th-moment

0	0.493289	1.32154
1	0.639603	1.12513
2	1.19426	0.934672
3	1.03310	0.799001
4	1.64878	0.697631
5	1.71234	0.661126
6	1.42330	0.594832
7	1.52975	0.519985
8	1.05092	0.449201
9	1.15186	0.384354
10	0.962308	0.322190
11	0.895831	0.281368
12	0.887191	0.242909
13	0.956521	0.209039
14	1.01782	0.186831

bin	Moment-2	Moment-3	Moment-4
0			
1			

2	 p−value=0.63 M₂= 0.70	 p−value=0.69 M₃= 1.25	 p−value=0.72 M₄= 2.73
3	 p−value=0.71 M₂= 1.03	 p−value=0.70 M₃= 2.08	 p−value=0.67 M₄= 5.09
4	 p−value=0.86 M₂= 1.62	 p−value=0.89 M₃= 3.79	 p−value=0.87 M₄= 10.65
5	 p−value=0.88 M₂= 2.24	 p−value=0.91 M₃= 5.83	 p−value=0.89 M₄= 18.12
6	 p−value=0.82 M₂= 3.05	 p−value=0.85 M₃= 8.79	 p−value=0.82 M₄= 30.10
	p−value=0.80 M₂= 4.87	p−value=0.86 M₃= 16.57	p−value=0.87 M₄= 66.08

7			
8	 p−value=0.65 M_3= 7.83	 p−value=0.65 M_3= 31.65	 p−value=0.63 M_4= 147.92
9	 p−value=0.68 M_3= 13.52	 p−value=0.73 M_3= 67.23	 p−value=0.72 M_4= 380.16
10	 p−value=0.53 M_3= 25.55	 p−value=0.52 M_3= 163.48	 p−value=0.52 M_4= 1166.99
11	 p−value=0.52 M_3= 42.34	 p−value=0.46 M_3= 333.83	 p−value=0.39 M_4= 2892.26
12	 p−value=0.49 M_3= 72.00	 p−value=0.42 M_3= 712.00	 p−value=0.34 M_4= 7624.00

13			
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