

# 全天区扫描方法在WCDA 阵列对TeV源的观测中的 应用和预期

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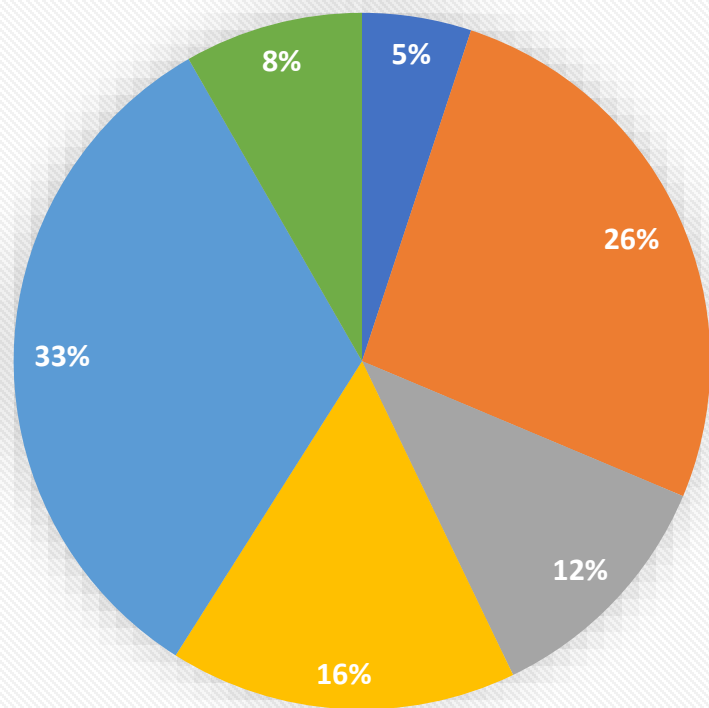
2018.10.10 林芝

# Introduction

- TeV源介绍
- WCDA的观测能力和预期
- 对各类源和现象的观测能力

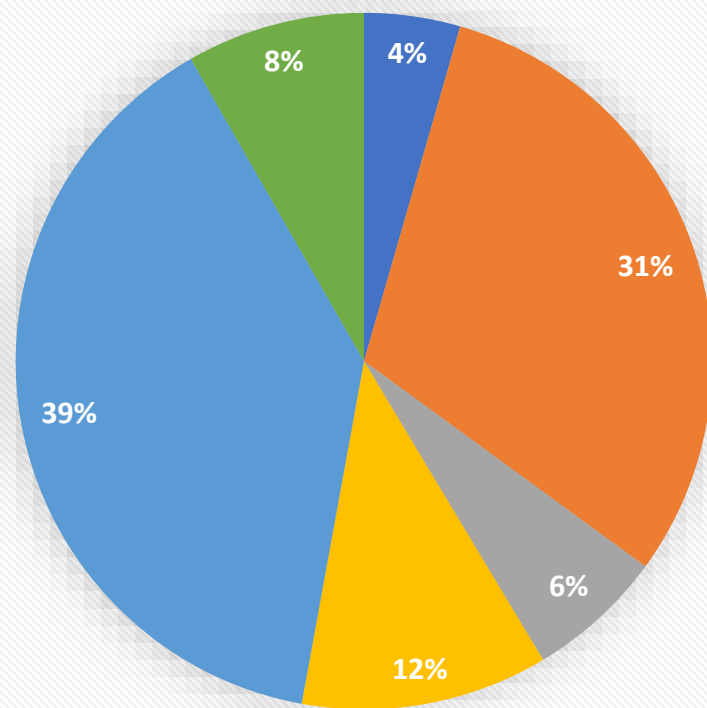
# 目前已经发现的TeV源

## TeV源(217个)



■ Binary ■ UNID ■ SNR/Shell ■ PWN ■ Blazar ■ Other

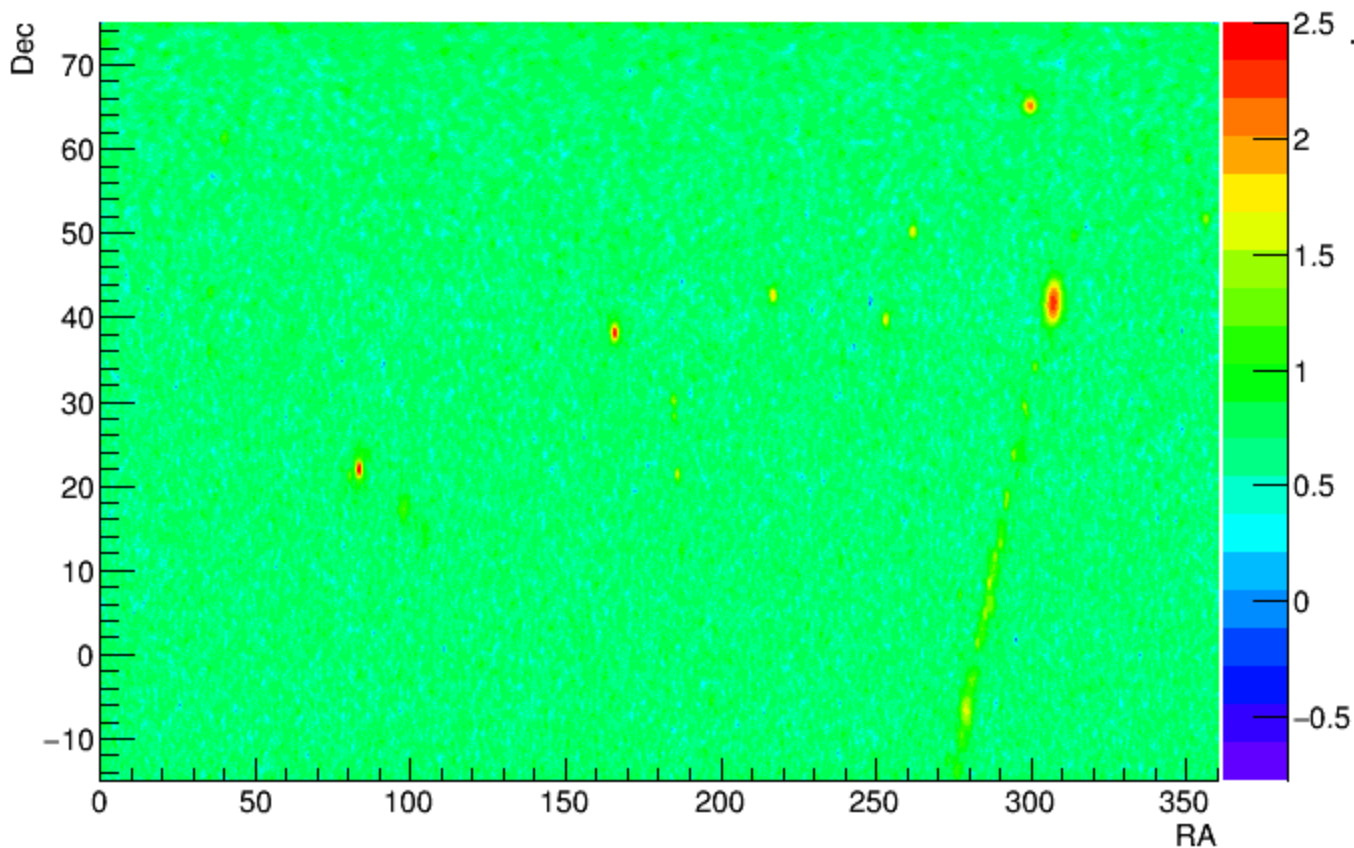
## LHAASO视场中(157个)



■ Binary ■ UNID ■ SNR/Shell ■ PWN ■ Blazar ■ Other

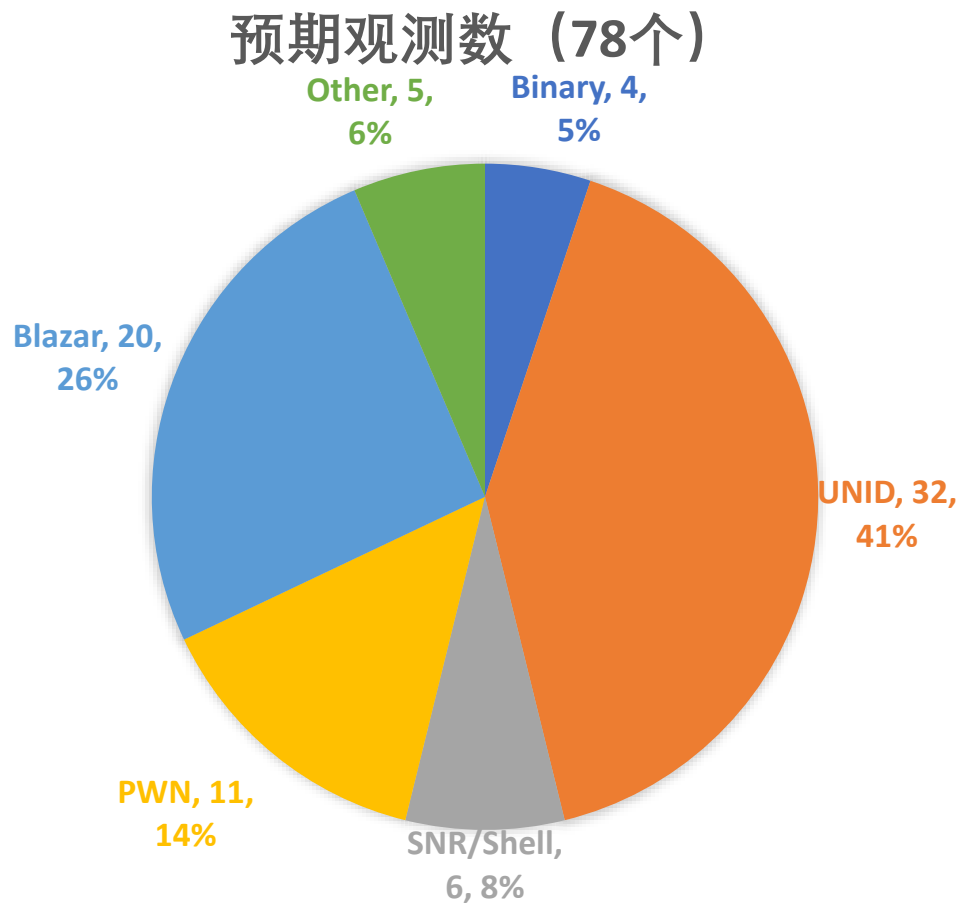
# WCDA 1yr 模拟显著性天图

- Blazar数量在视场中比例最高，考虑到EBL的吸收，我们选择 $E > 1\text{TeV}$ 能段进行模拟。

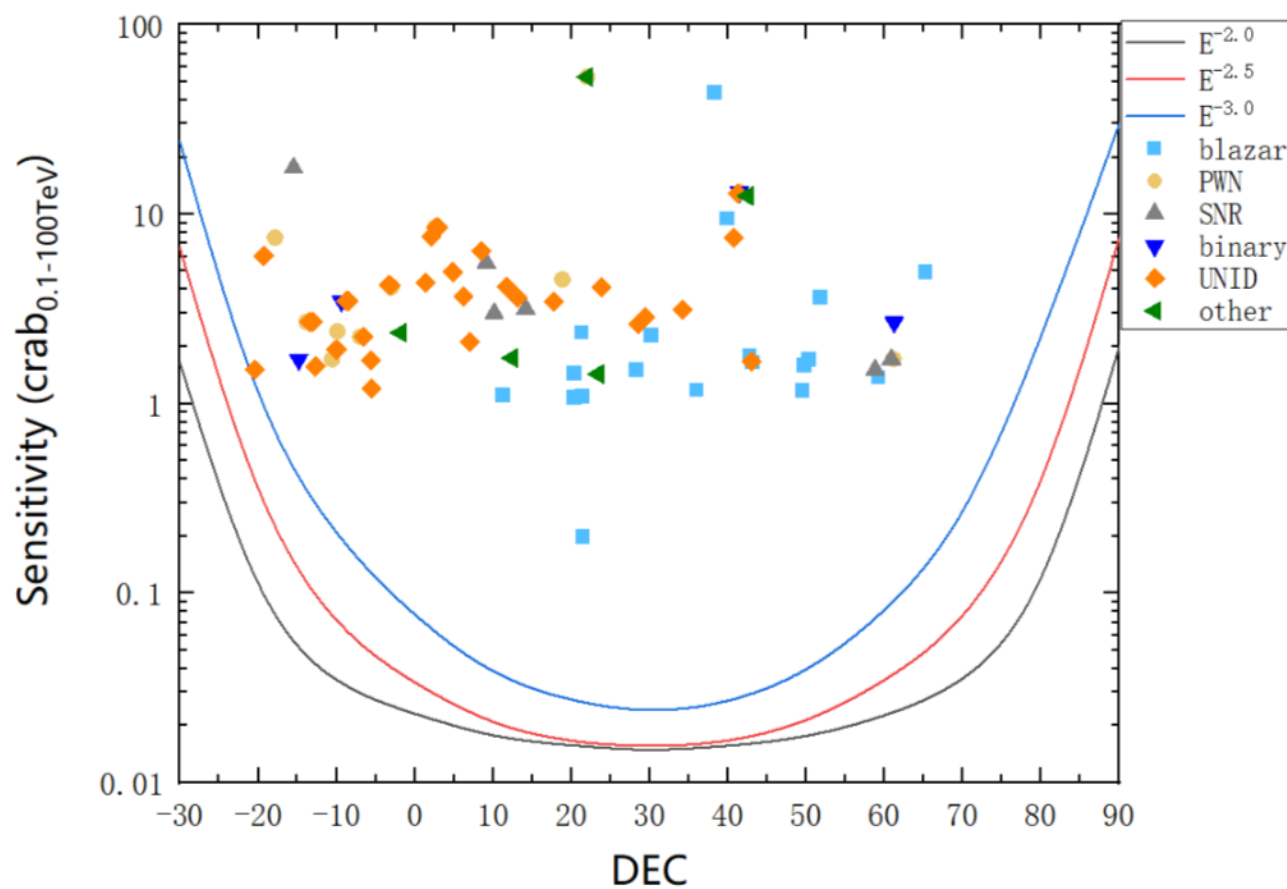


# WCDA预计能看到的源

- 与TeVCat组成基本一致
- Blazar受EBL吸收影响, 比例下降



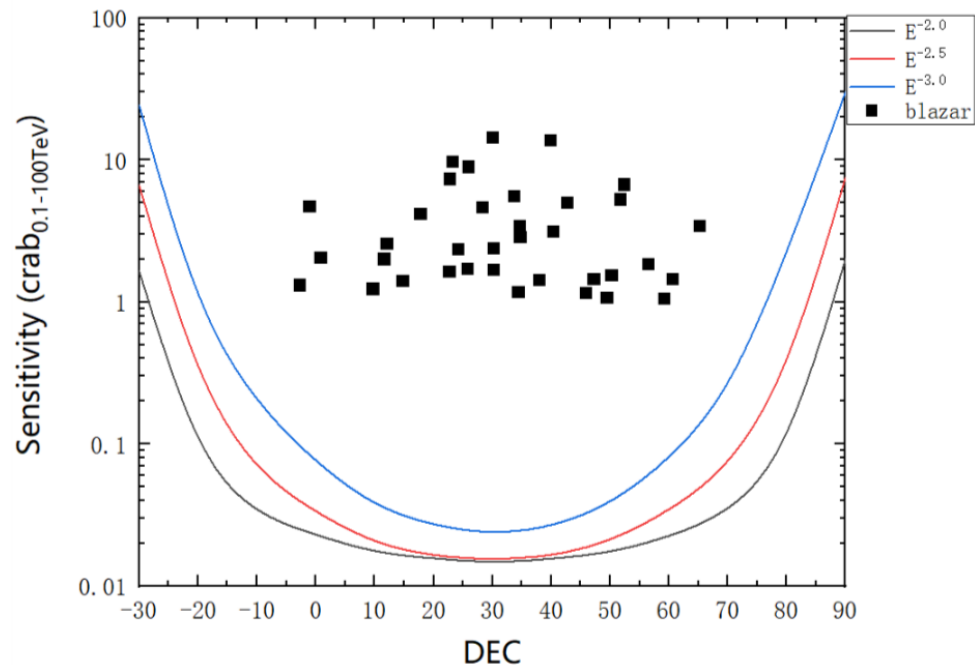
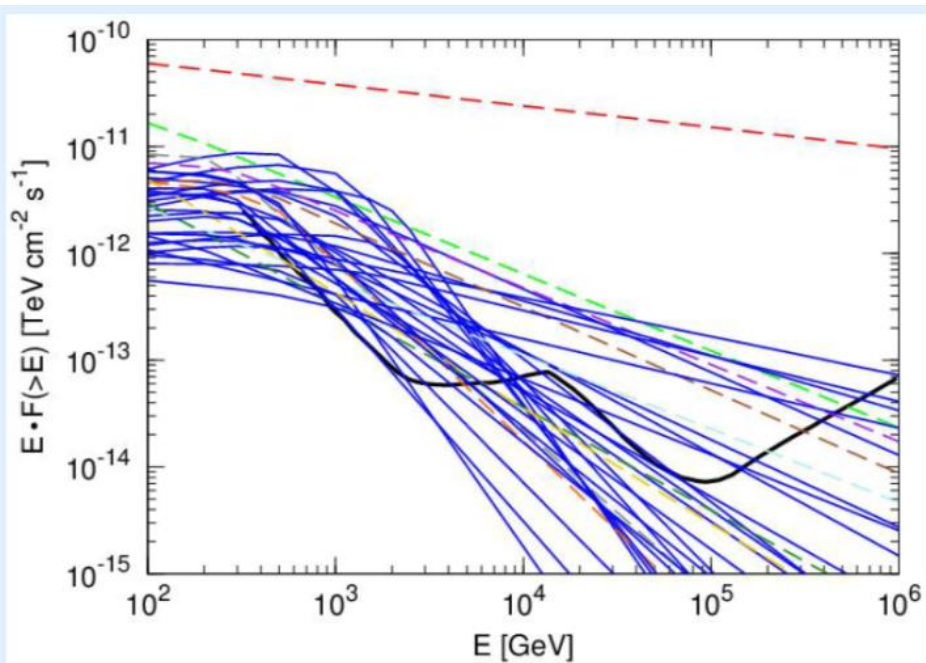
# 能谱指数和DEC对观测的影响



# 与Zhao Yi (2016)结果的对比

Zhao Yi (2016) 方法1

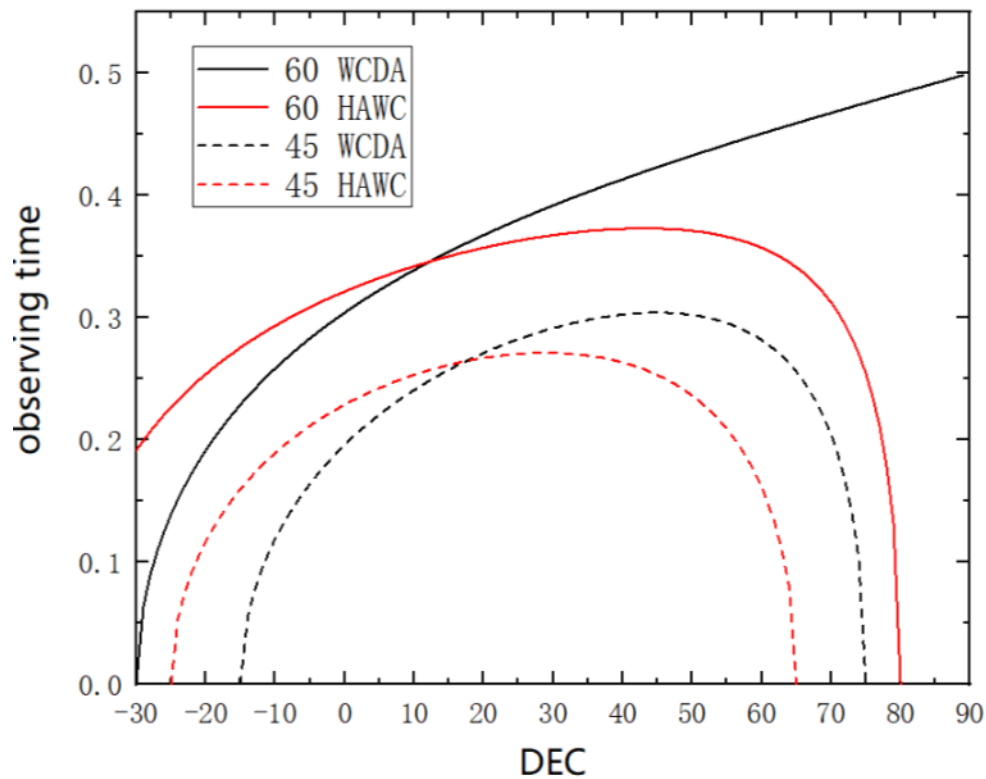
已知的TeV blazar源抽样估计LHAASO视场中的低红移blazar的TeV能谱，共101个，与CRAB灵敏度曲线比较，预测有33个可观测源。同样的能谱带入我们的计算，可得到37个可观测源。



# 与HAWC的对比

- 507d, 39个源

	HAWC 507d	WCDA 365d
Blazar	2	20
SNR	2	6
PWN	7	11
*PWN/SNR/ Molec. Cloud	14	28*
total	25	65*



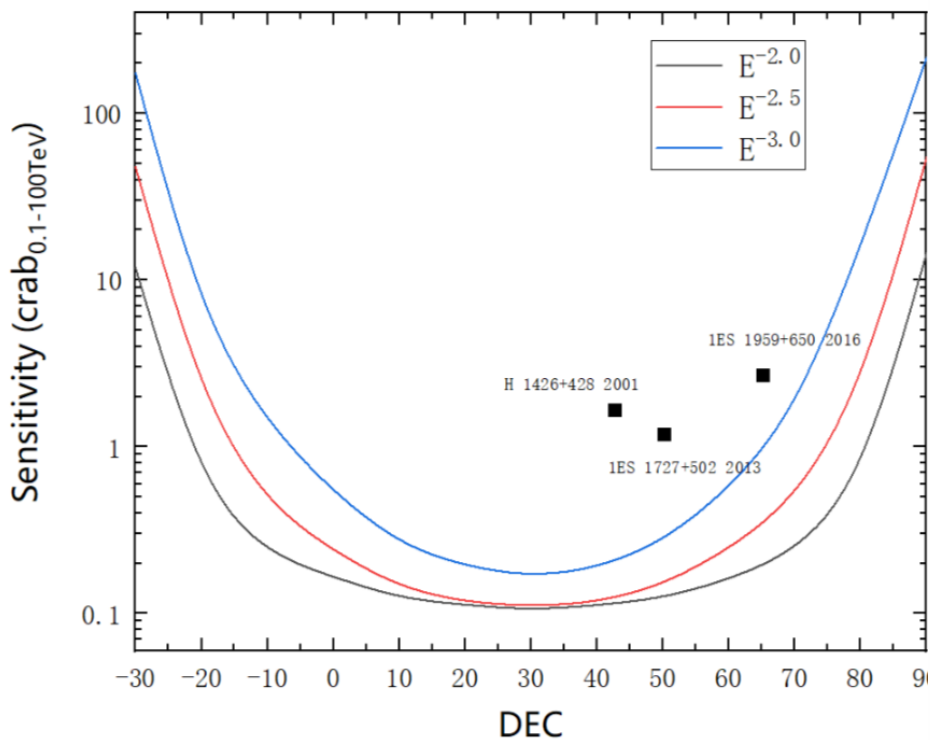


# Blazar观测预期的理解

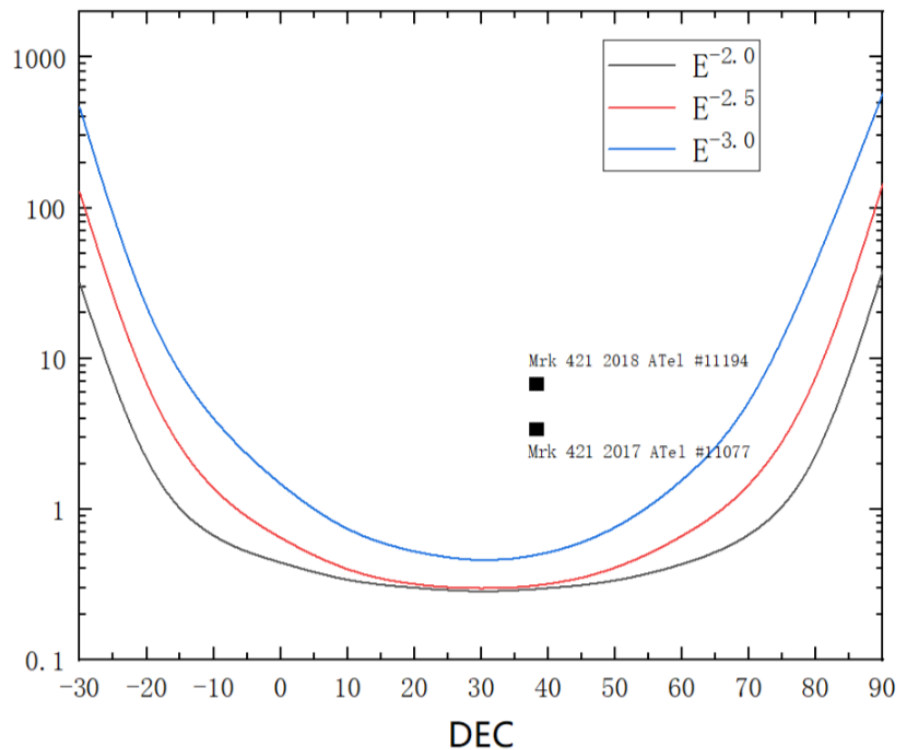
TeVCat NAME	NAME	RA	DEC	SIGNI (WCDA)	SIGNI (+crab cal.)	SIGNI (+HAWC lat. cal.)
<a href="#">TeV J1104+382</a>	<a href="#">Markarian 421</a>	166.0791667	38.19472222	106.52	41.372368	35.51
<a href="#">TeV J1653+397</a>	<a href="#">Markarian 501</a>	253.4675	39.76027778	67.93	26.384012	22.6433
<a href="#">TeV J1959+651</a>	<a href="#">1ES 1959+650</a>	299.9991667	65.14861111	25.85	10.04014	2.758
<a href="#">TeV J2347+517</a>	<a href="#">1ES 2344+514</a>	356.7666667	51.71361111	18.42	7.154328	4.915
<a href="#">TeV J0521+211</a>	<a href="#">VER J0521+211</a>	80.4375	21.21427778	11.96	4.645264	4.68
<a href="#">TeV J1221+301</a>	<a href="#">1ES 1218+304</a>	185.3595833	30.19138889	11.54	4.482136	2.76
<a href="#">TeV J1217+301</a>	<a href="#">1ES 1215+303</a>	184.4520833	30.10166667	11.54	4.482136	2.68
<a href="#">TeV J1428+426</a>	<a href="#">H 1426+428</a>	217.1358333	42.6725	9.28	3.604352	3.09
<a href="#">TeV J1230+123</a>	<a href="#">M 87</a>	187.6966667	12.3975	8.68	3.371312	3.535
<a href="#">TeV J1728+502</a>	<a href="#">1ES 1727+502</a>	262.0775	50.21944444	8.64	3.355776	2.78
<a href="#">TeV J0222+430</a>	<a href="#">3C 66A</a>	35.67333333	43.04319444	8.31	3.227604	2.87
<a href="#">TeV J2056+496</a>	<a href="#">RGB J2056+496</a>	314.1779167	49.66861111	8.06	3.130504	2.76
<a href="#">TeV J1221+282</a>	<a href="#">W Comae</a>	185.3820833	28.23305556	7.58	2.944072	5.725
<a href="#">TeV J0232+202</a>	<a href="#">1ES 0229+200</a>	38.22166667	20.2725	7.28	2.827552	6.342
<a href="#">TeV J0710+591</a>	<a href="#">RGB J0710+591</a>	107.61	59.15	6.93	2.691612	2.91
<a href="#">TeV J0218+359</a>	<a href="#">S3 0218+35</a>	35.27291667	35.93722222	5.94	2.307096	2.965
<a href="#">TeV J1015+494</a>	<a href="#">1ES 1011+496</a>	153.7670833	49.43361111	5.9	2.29156	1.977
<a href="#">TeV J1555+111</a>	<a href="#">PG 1553+113</a>	238.93625	11.19472222	5.6	2.17504	3.98
<a href="#">TeV J1943+213</a>	<a href="#">HESS J1943+213</a>	295.9791667	21.30222222	5.51	2.140084	1.837
<a href="#">TeV J2243+203</a>	<a href="#">RGB J2243+203</a>	340.9666667	20.32	5.43	2.109012	1.81

# 对时变源的观测能力

- 多种天体存在短时间爆发现象



1 week



1 day

# IC 170922A/TXS 0506+056

- TXS 0506+056, 靠近南极的地平线, 掠入射, 既可屏蔽背景, 又不会吸收高能中微子
- $2.0 \pm 0.4 \text{ e-10 TeV}^{-1} \text{ cm}^{-2} \text{ s}^{-1} @130\text{GeV}$   
index =  $-3.9 \pm 0.4$

	WCDA 12d
IC 170922A @DEC +5.6°	0.44
IC 170922A @DEC +30°	0.63

# SS 433

HAWC 在10TeV之上发现SS433的伽马辐射，且至少达到25 TeV.

1. leptonic emission.
  - a. proton budget; b. X-ray flux; c. slow diffusion
2. constraint on magnetic field strength
3. acceleration mechanism.

SS433 w1:

$$2.1_{-0.5}^{+0.6}(\text{stat.})_{-1.2}^{+1.2}(\text{syst.}) \times 10^{-16} \text{ TeV}^{-1} \text{ cm}^{-2} \text{ s}^{-1}. \quad @20\text{TeV} \quad \text{index} = -2$$

	HAWC 1017d	WCDA 365d
SS433 @DEC +5°	4.2	4.0
SS433 @DEC +15°		4.8
SS433 @DEC +30°		6.0

谢谢!