



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope Array Collaboration

¹Universite Libre de Bruxelles, Bruxelles, Belgium



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

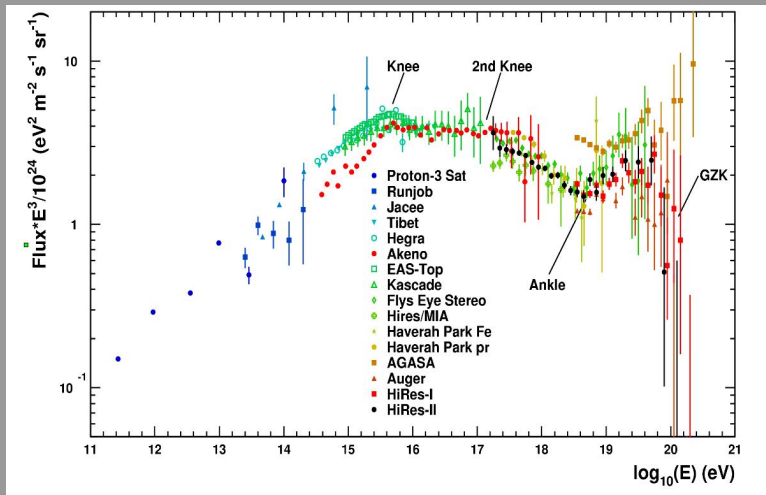
TA detector

CR spectrum

Composition and
anisotropies

Summary

High-energy CR spectrum in more detail



TELESCOPE
ARRAY: FIRST
RESULTS

P. Tinyakov[†]
for the Telescope
Array
Collaboration

Introduction

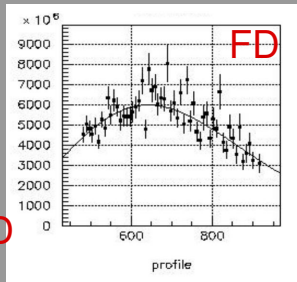
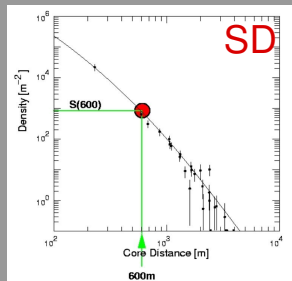
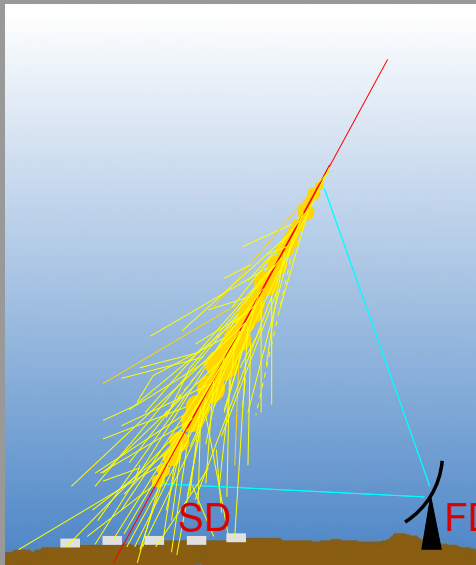
TA detector

CR spectrum

Composition and
anisotropies

Summary

Registration of UHECR



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

**Composition and
anisotropies**

Summary

UHECR experiments



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

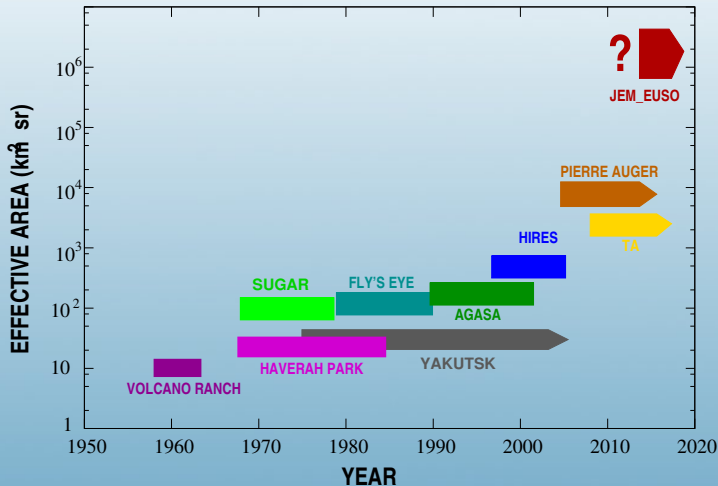
Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary



TELESCOPE ARRAY HYBRID DETECTOR



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

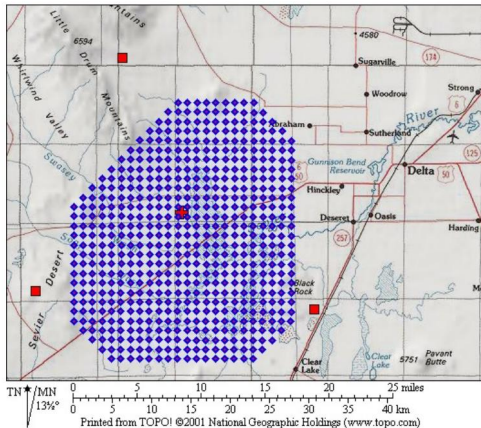
Introduction

TA detector

CR spectrum

Composition and
anisotropies

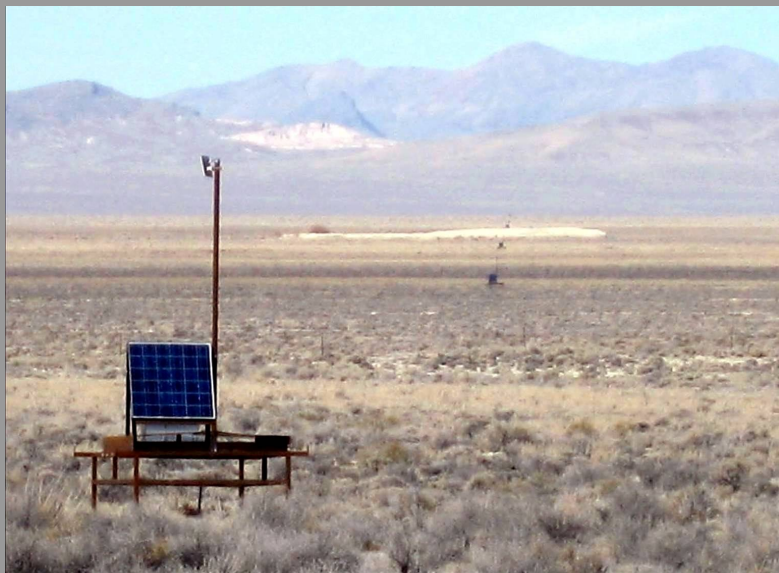
Summary



- ▶ Situated in Utah, USA
- ▶ 507 scintillator detectors over 680 km²
- ▶ 3 towers, 38 telescopes
- ▶ Complete and operational as of 1/2008

SD relative size: TA $\sim 9 \times$ AGASA \sim PAO/4

SURFACE DETECTOR



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

TRIPLE EVENT (2008-10-26)



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

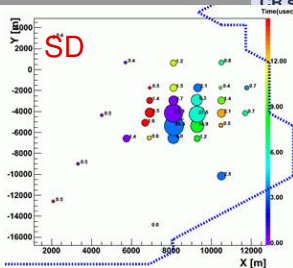
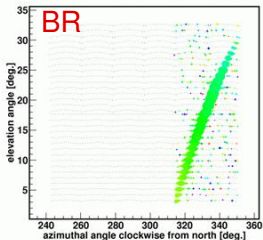
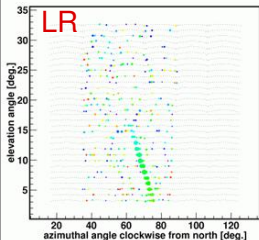
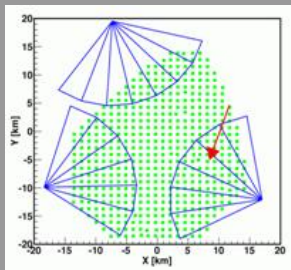
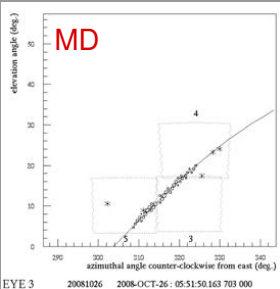
Introduction

TA detector

CR spectrum

Position and
Anisotropies

Primary



DETECTOR RESOLUTION



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

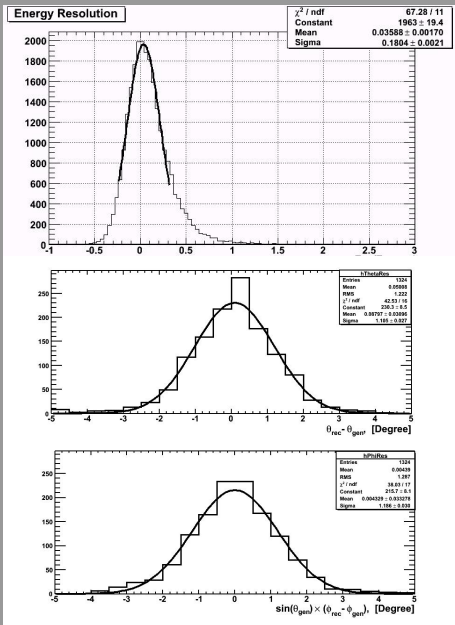
Introduction

TA detector

CR spectrum

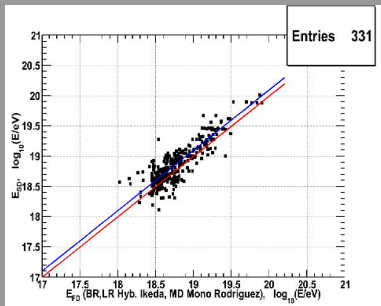
Composition and anisotropies

Summary

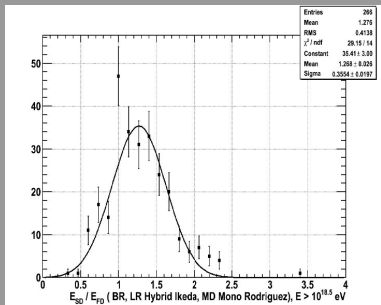


- ▶ Energy: 20%
- ▶ Zenith: 1.1°
- ▶ Azimuth: 1.2°

ENERGY SCALE



- ▶ Energy scale of SD is set to that of FD
 - ▶ This amounts to ~ 27% shift downward
- (note: without shift, SD is compatible with AGASA)



TELESCOPE
ARRAY: FIRST
RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

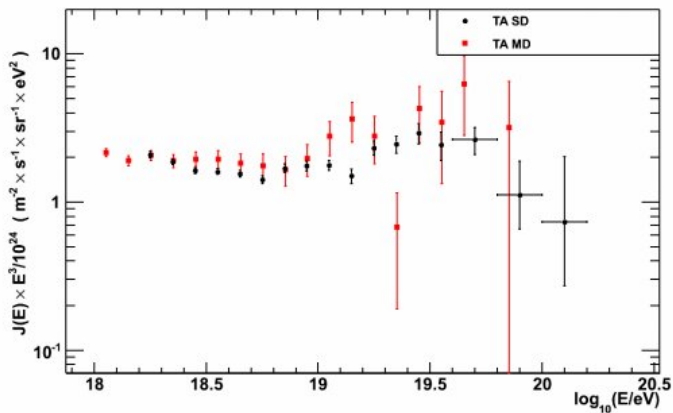
Summary

TA SD vs Middle Drum spectrum



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration



Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

TA SD vs TA Hybrid spectrum



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

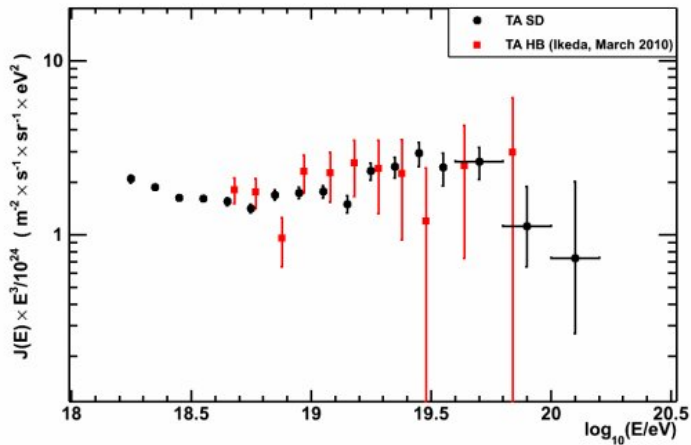
Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

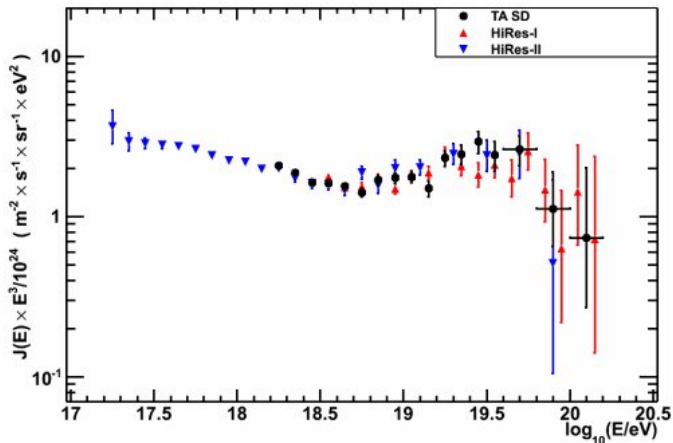


TA SD vs HiRes spectrum



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration



Introduction

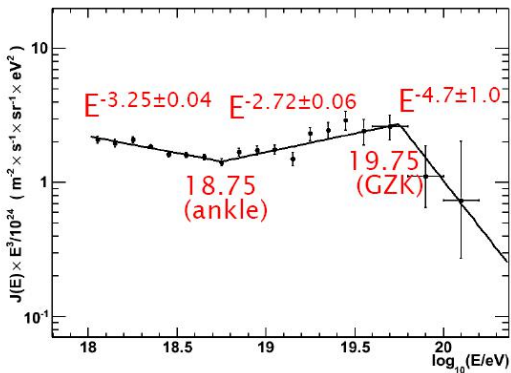
TA detector

CR spectrum

Composition and
anisotropies

Summary

TA SD Spectrum



(Solid line is a simple 0.1 logE-bin χ^2 fit)



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

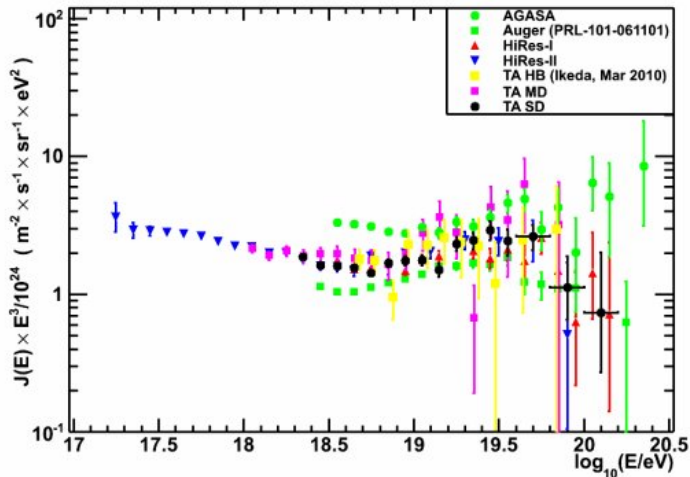
TA detector

CR spectrum

Composition and
anisotropies

Summary

TA spectrum vs other experiments



TELESCOPE ARRAY: FIRST RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

COMPOSITION: compatible with protons



TELESCOPE
ARRAY: FIRST
RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

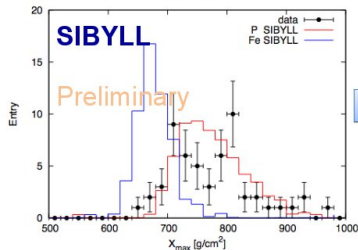
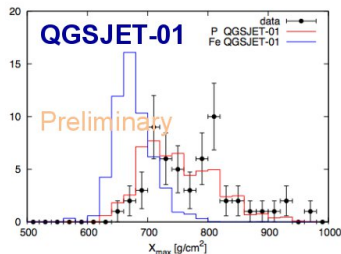
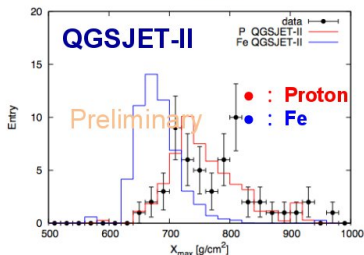
TA detector

CR spectrum

Composition and
anisotropies

Summary

x_{max} Data/MC comparison



χ^2 / dof

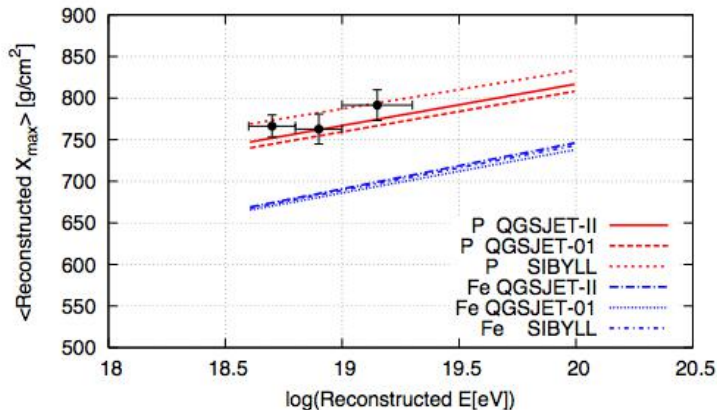
	QGSJET-II	QGSJET-01	SIBYLL
P	1.44	1.046	1.63
Fe	55.54	56.67	85.71

COMPOSITION: compatible with protons



TELESCOPE
ARRAY: FIRST
RESULTS

P. Tinyakov¹
for the Telescope
Array
Collaboration



Introduction

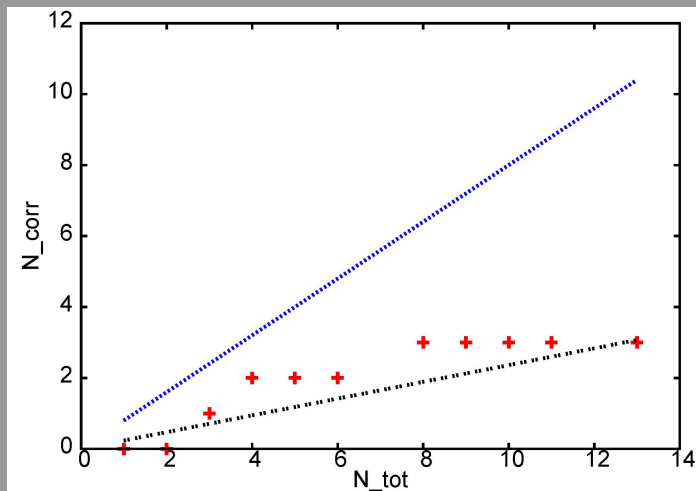
TA detector

CR spectrum

Composition and
anisotropies

Summary

ANISOTROPIES: no correlations with AGN



Total events: 13; correlated: 3; expected by chance: 3.0

⇒ no effect



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

SUMMARY

- ▶ TA is the **LARGEST** ultra-high energy cosmic ray detector in the Northern hemisphere
- ▶ TA CR spectrum is compatible with that observed by HiRes; in particular, TA confirms the cut off
- ▶ Complete composition and anisotropy analyses are on the way



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

**Composition and
anisotropies**

Summary

SUMMARY

- ▶ TA is the **LARGEST** ultra-high energy cosmic ray detector in the Northern hemisphere
- ▶ TA CR spectrum is compatible with that observed by HiRes; in particular, TA confirms the cut off
- ▶ Complete composition and anisotropy analyses are on the way



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary

SUMMARY

- ▶ TA is the **LARGEST** ultra-high energy cosmic ray detector in the Northern hemisphere
- ▶ TA CR spectrum is compatible with that observed by HiRes; in particular, TA confirms the cut off
- ▶ Complete composition and anisotropy analyses are on the way



**TELESCOPE
ARRAY: FIRST
RESULTS**

P. Tinyakov¹
for the Telescope
Array
Collaboration

Introduction

TA detector

CR spectrum

Composition and
anisotropies

Summary