

THE GELATICA NETWORK DISPOSITION

The network of small Cosmic Ray (CR) stations named GELATICA (GEORGIAN Large-area Angle and TIME Coincidence Array) is operating in Georgia as research and educational project.

There are five small CR stations of GELATICA network.

The stations of GELATICA network are located in the roof spaces of:

1. **AIP:** E. Andronikashvili Institute of Physics (Tbilisi State University), building II; 41.720329°N, 44.744092°E, 495 m asl;
2. **TSU:** I. Javakhishvili Tbilisi State University, building II; 41.710428°N, 44.776966°E, 475 m asl ;
3. **GTU:** Georgian Technical University, building IV; 41.723406°N, 44.777440°E, 450 m asl ?;
4. **HEPI:** High Energy Physics Institute, (Tbilisi State University); 41.717096°N, 44.711565°E, 530 m asl ?;
5. **TEL:** J. Gogebashvili Telavi State University, building I. 41.910301°N, 45.468106°E, 845 m asl.

The standard deviations of all goniometers' locations are provisionally taken to be ± 5 m in vertical direction and equal to the radius of the circles of the detectors' locations – in both horizontal directions.

The dispositions of GELATICA stations are shown in **figures 1 and 2**, while their properties are described in the parts «GELATICA ARRANGEMENT» and in the parts describing Properties of the GELATICA Goniometers.



Figure 1. Disposition of EAS goniometers of the GELATICA network
Sensitivity circles are shown for AIP and TEL goniometers for vertical showers only for showers with maximal energy $E = 10^{20}$ eV;

Every CR station of this network detects the EAS events and logs out both the [Universal Coordinated Time](#) (UTC) of EAS front passage and the shower's arrival direction. The ground-based installations with such capabilities hereinafter are referred to as "EAS goniometer" or simply "goniometer". The GPS system allows EAS front passage timing with accuracy up to 1 μ s, while the EAS goniometer system measures the local arrival direction of the shower's front with average error of 3°. The used method of the shower's arrival direction estimation is briefly outlined in the part «GELATICA TECHNIQUE».

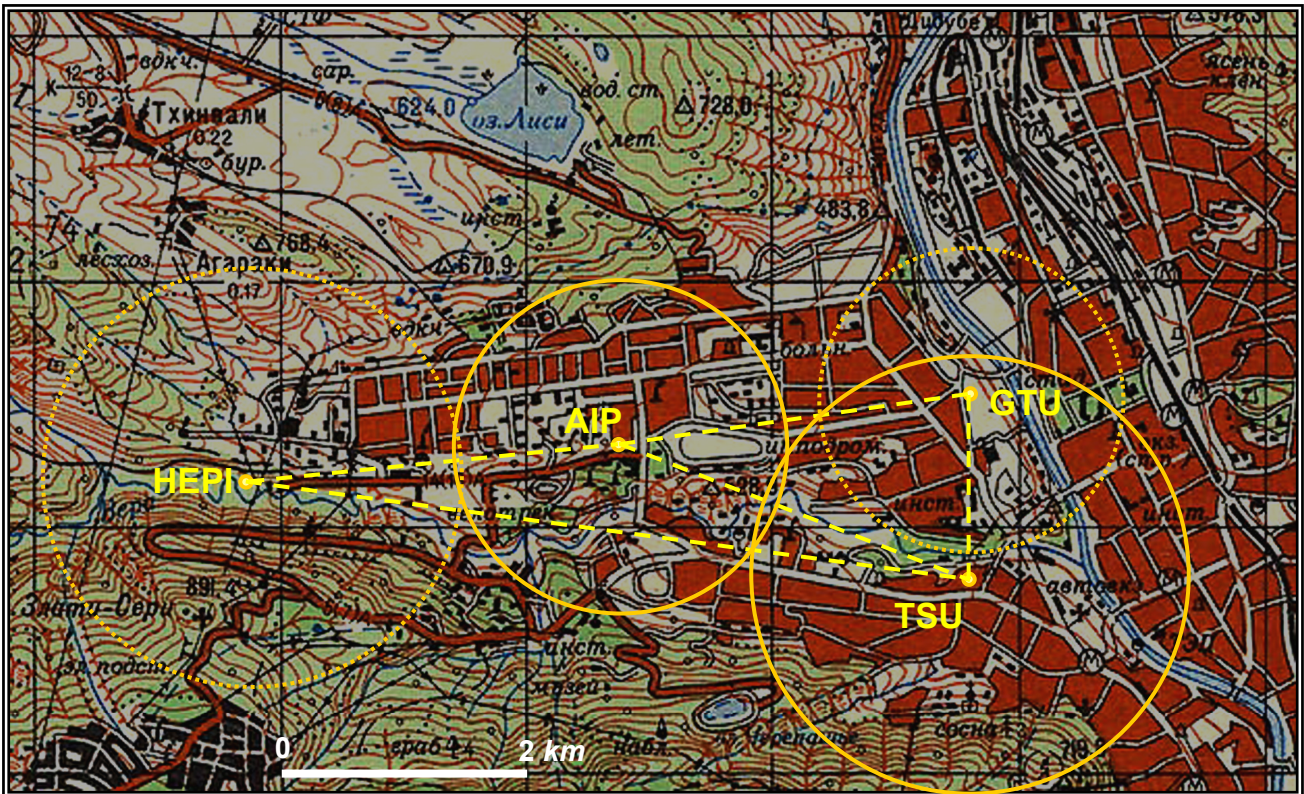


Figure 2. Disposition of GELATICA goniometers within the area of Vake-Saburtalo district, Tbilisi. Sensitivity circles are shown for every goniometer for vertical showers only for showers with maximal energy $E = 10^{20}$ eV; the circles for GTU and HEPI goniometers are *presumable* only.

The maximal radii of sensibility for every GELATICA goniometer are estimated as is described in the part «**GONIOMETERS' GENERIC PROPERTIES**».

Table 1 *Maximal radii of sensibility for every GELATICA goniometer for EAS with energies $5 \cdot 10^{20}$ eV with any inclination.*

AIP	TSU	GTU	HEPI	TEL
2194m	2944m	not estimated	not estimated	3085m

So some pairs of goniometers within the Saburtalo-Vake district (**figure 2**) can observe simultaneously the separate parts of a rare single EAS event with large enough total energy, while the simultaneous observation of a single EAS event by TEL goniometer along with any goniometer within Tbilisi area is impossible.

Distances between these locations are calculated with use of the standard reference ellipsoid of [World Geodetic System WGS84](#); fixed parameters of this ellipsoid are: equatorial radius $R_E = 6378137$ m, flattening $f = 1/298.257223563$, that is the polar radius is $R_P = 6356752.3142$ m. The local altitude elevation is measured out vertically from the reference ellipsoid surface.

Table 2 *Distances between goniometers*

	TSU	GTU	HEPI	TEL
AIP	(2 945±9)m	(2 792±9)m	(2 727±9)m	(63 676±9)m
TSU		(1 443±10)m	(5 486±7)m	(61 503±8)m
GTU			(5 519±8)m	(60 945±8)m
HEPI				(66 346±8)m