A New System of
100 GeV
Imaging Cherenkov Telescopes

F. Aharonian, W. Hofmann, H. Völk ...,
G. Hermann

Max-Planck-Institut für Kernphysik Heidelberg

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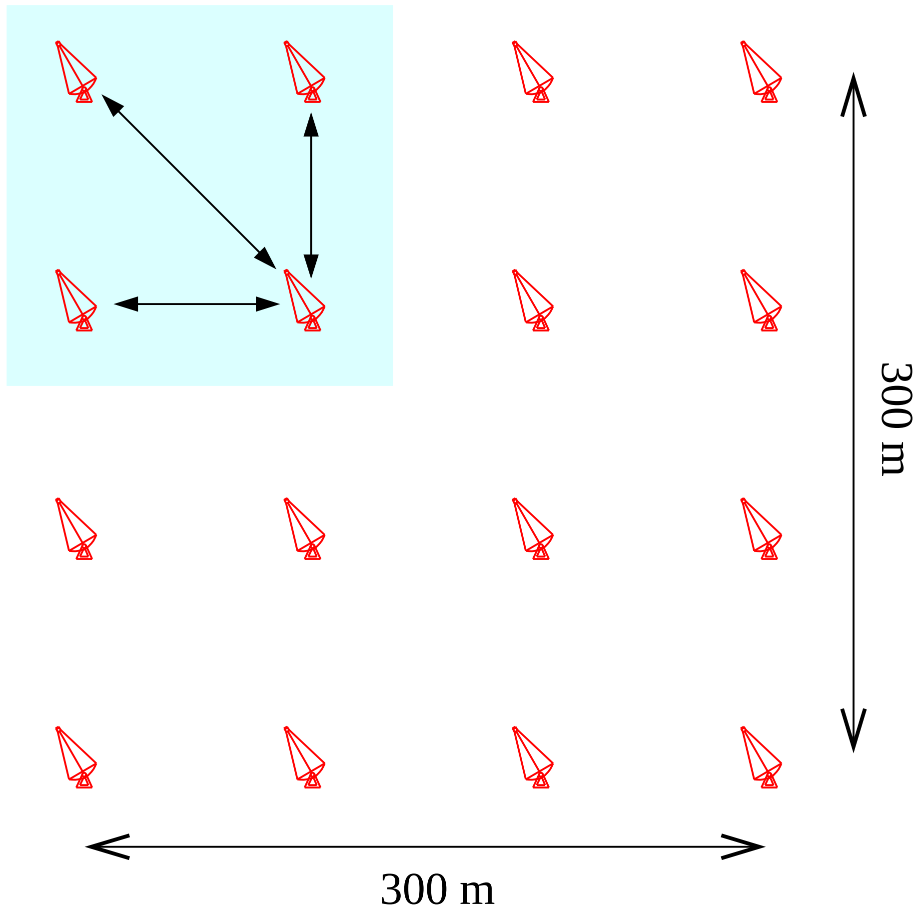
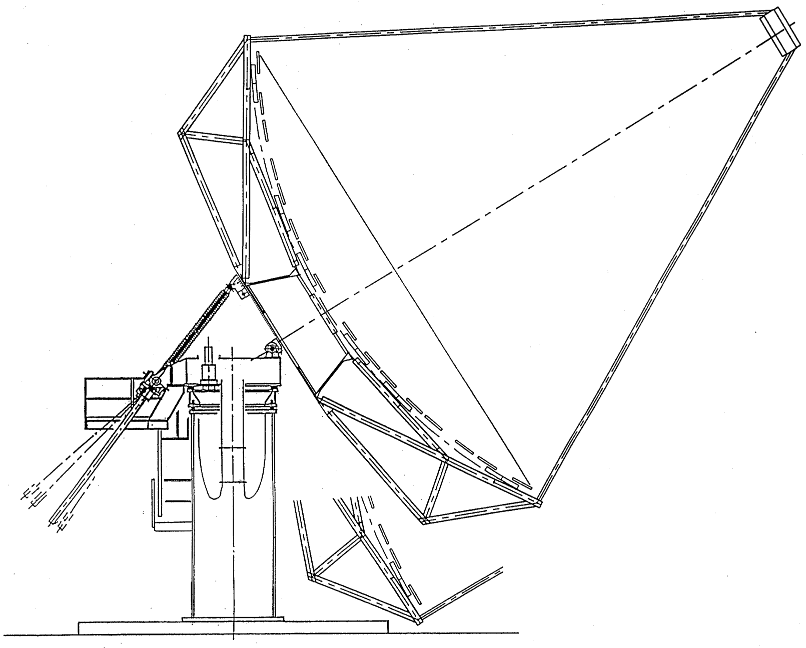
Array of 4–16 IACTs for Stereoscopic Observations

Design Parameters: (conservative estimates)

E_{thr}	100 GeV
$F_{min}(E>100\ \mathrm{GeV})$	$10^{-12}\ \mathrm{cm}^{-2}\ \mathrm{s}^{-1}$
FoV	4 deg
$\sigma_{\ominus}$	$<0.1^{o}$
σ_E/E	$< 20\ \%$



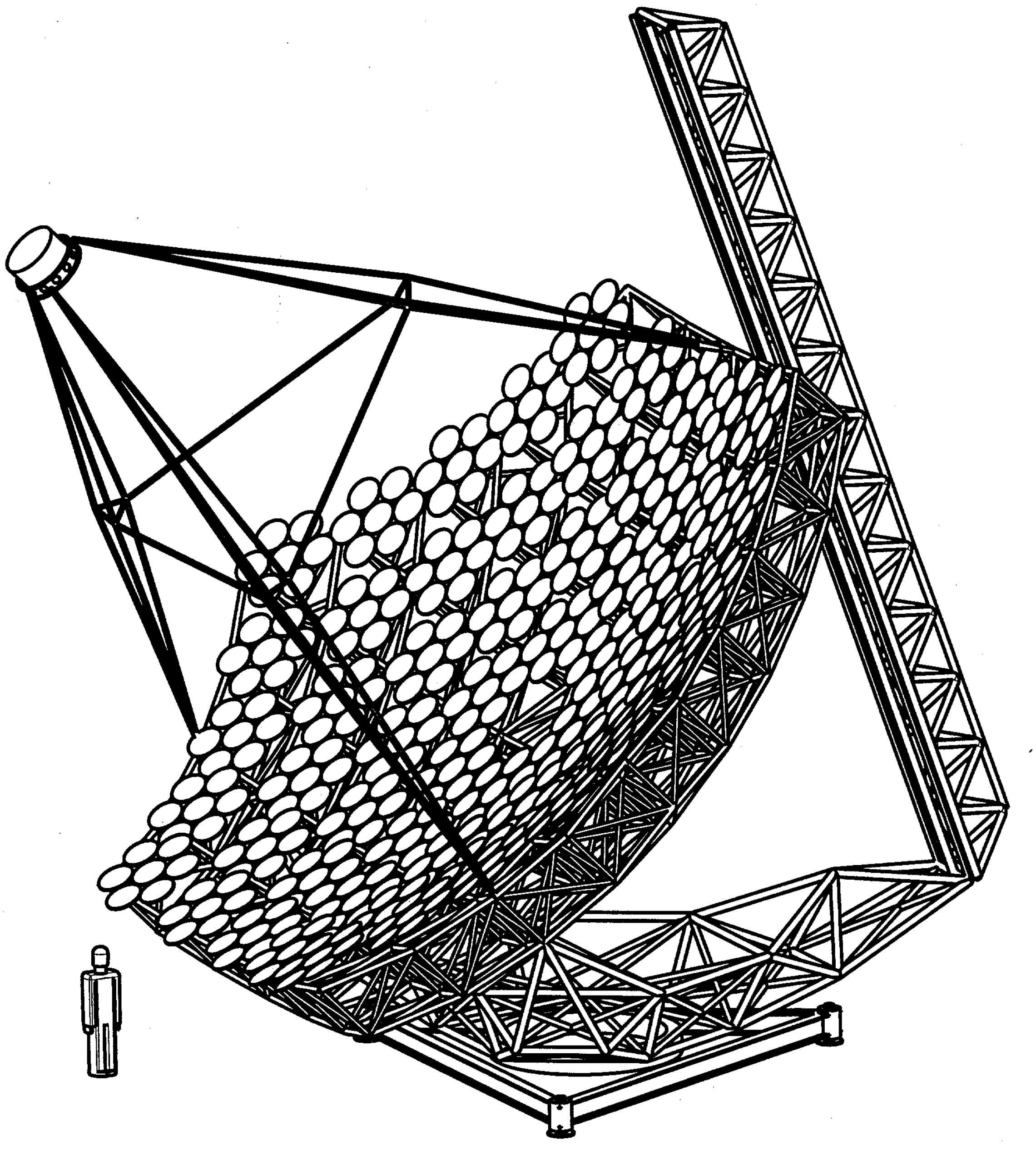


Two options for mount studied so far:

1) Modified azimuthal mount:	Dish supported by three symmetrically arranged points
	Altitude adjustment $\rightarrow$ linear drive
	Dish: space frame with triangular cells
2) 'Conventional' design :	communication antenna
	standard azimuthal mount
	Altitude adjustment $\rightarrow$ linear drive
	Dish: radial trusses from central hub

Mirror dish:

Mirrors :	Aluminum; ∅ 50 cm
	61 clusters of 7 mirrors $\rightarrow$ 84 m^2
	clusters remotely adjustable
Focal length:	12 – 15 m
Spot Size:	$< 0.05^o$



Design study of an array telescope with its tiled mirror and modified alt–azimuth mount.

Camera and R/O–Electronics

Two Options depending on cost per channel

Requirement: Large field of view and fine granularity

Pixel ∅	0.15^o	0.25^o
# Pixel	≈ 800	271

$\rightarrow$ homogeneous pixel size

Photondetector: Photomultipliers

Digitization:
Time & pulse shape information
history of signals, 2 μsec buffer
150–300 MHz sampling

Option 1)
Highly integrated electronics
custom designed ASICs $\rightarrow$ analog pipeline
Trigger sytem & pipeline IC inside the camera
$\Rightarrow$ 800 pixels

Option 2)
'Standard' FADC–solution
VME–based 16 channel FADC boards;
120 MHz (200 MHz) sampling, 34 μsec ringbuffer;
$\Rightarrow$ 270 pixels

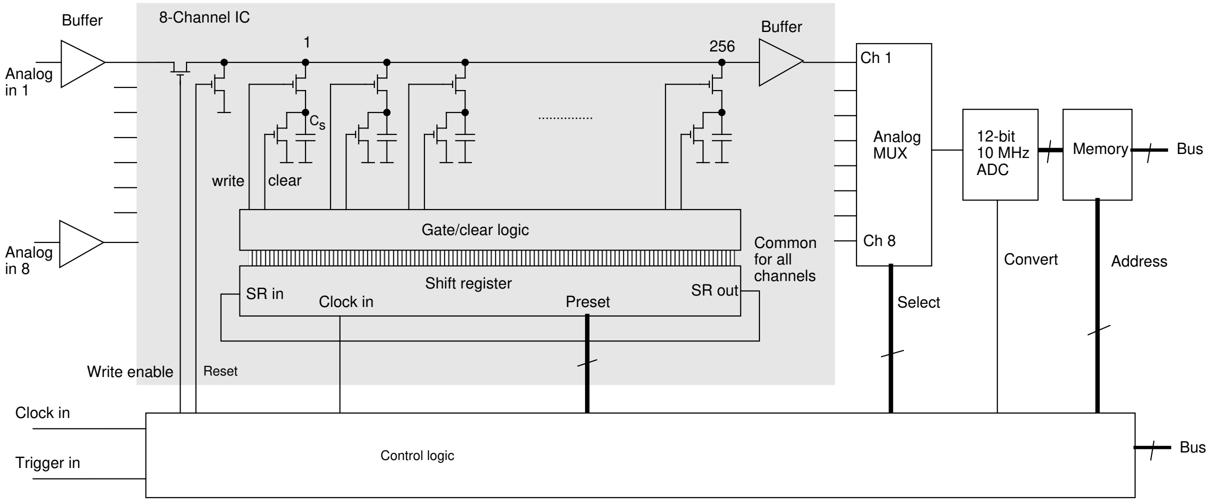
Trigger: 3 levels

1^{st} level:
2–4 fold majority;
Threshold of 25 – 10 p.e.

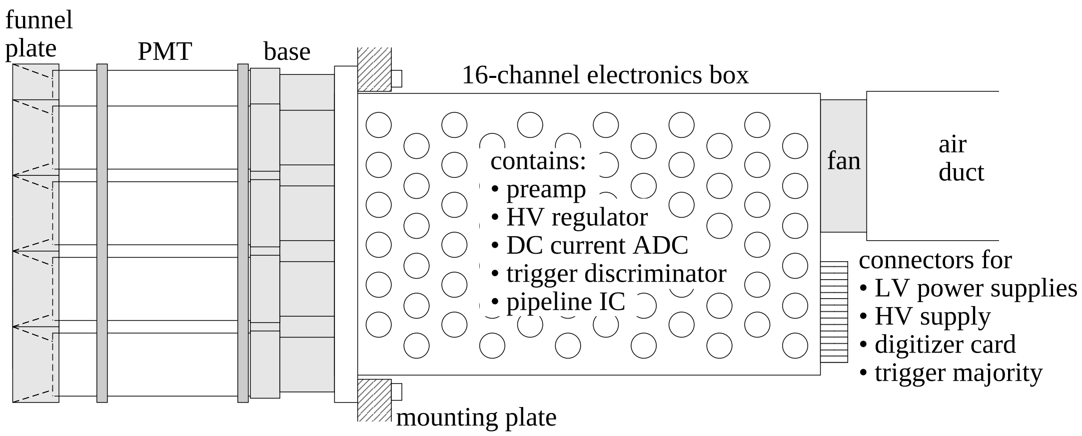
2^{nd} level:
Image Topology
require the light distribution to be compact

3^{rd} level:
Multi telescope coincidence
3 CTs within a cell of 4

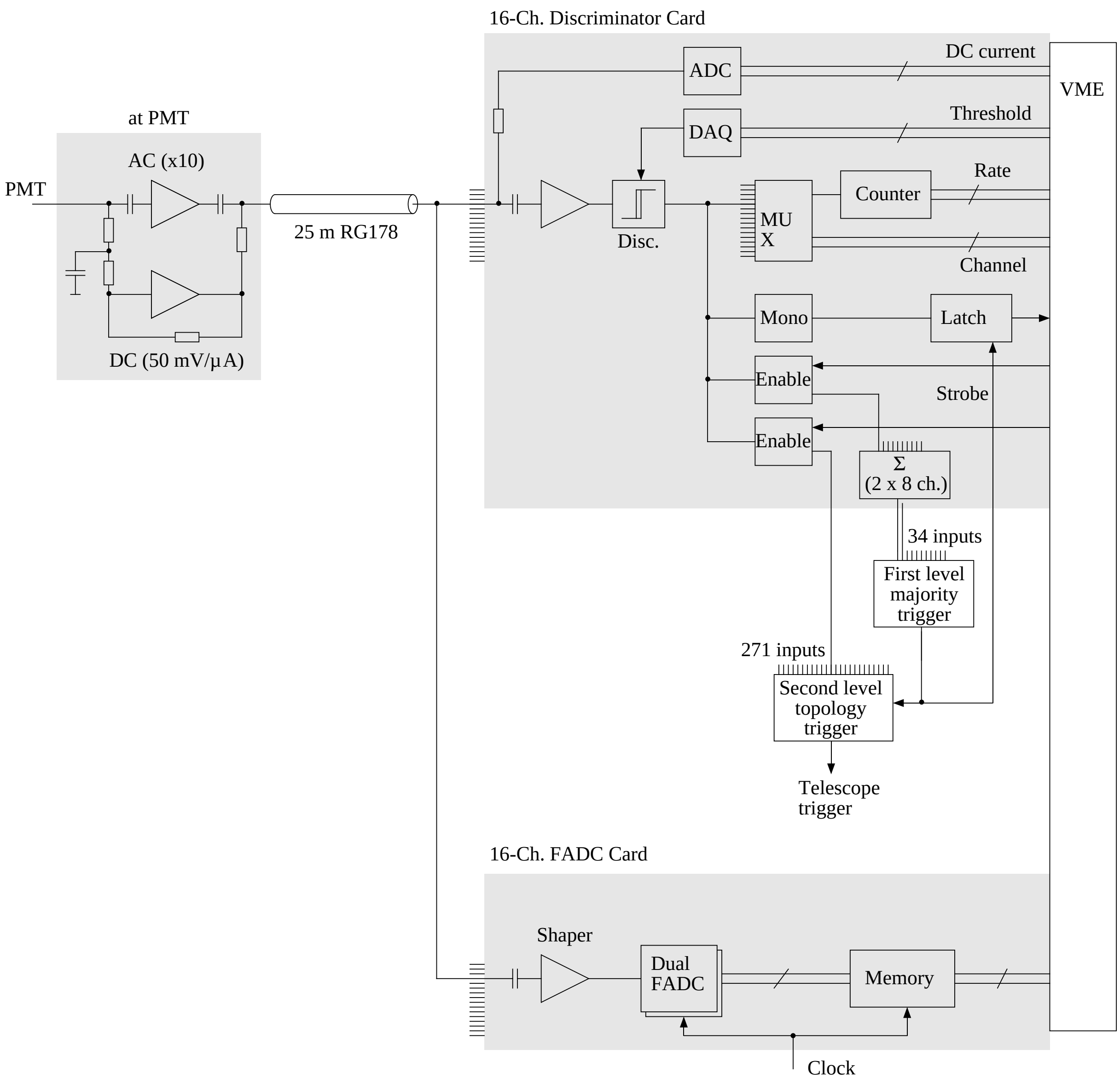
$\rightarrow$ completely computer controlled



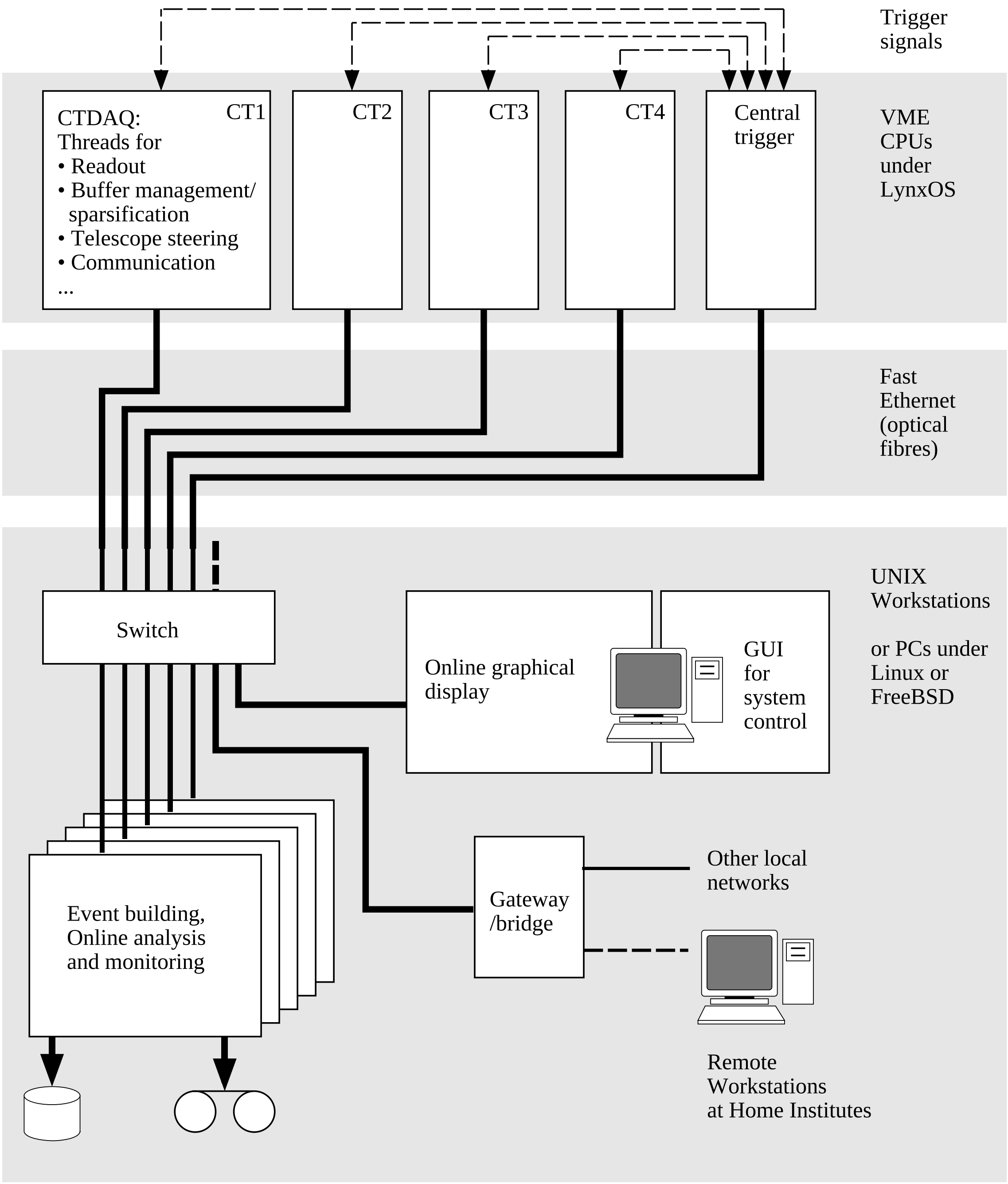
Switched capacitor pipeline for sampling and storage of the input signal at frequencies between 250 and 300 MHz.



16–channel PMT module with integrated electronics.



FADC readout system including preamplifiers, trigger discriminators and current monitoring.



Architecture of the data acquisition system.

Costs:

⇒ $\approx$ 1500 kDM per Telescope

Status:

⇒ Detailed simulations & design studies in progress

⇒ Detailed 'Letter of Intend' soon ($\sim$ 1 month)

⇒ Aim for starting operation first CTs in 2000

Location:

⇒ Calar Alto (Spain);
MPI–Astronomie Infrastructure
supports CT proposal

⇒ La Palma ?

Institutions:

⇒ So far two departments of MPIK–Heidelberg
(Astrophysics, Particle Physics)
seed funding available

Collaborators:

You are welcome !