



## **School and Workshop on Neutrino Particle Astrophysics**

**Les Houches**

**21 Jan -1 Feb 2002**

### Organisation

S. Basa (Centre de Physique de Particules de Marseille, France)

J. Carr (Centre de Physique de Particules de Marseille, France)

G. Domogatsky (Institute for Nuclear Research, Moscow, Russia)

S. Karkar (Centre de Physique de Particules de Marseille, France)

L. Moscoso (Service de Physique des Particules, CEA-Saclay, France)

J. Paul (Service d'Astrophysique, CEA-Saclay)

G. Pelletier (Laboratoire d'Astrophysique de l'Observatoire de Grenoble, France)

C. Spiering (DEST Zeuthen, Germany)

### Sponsors

CNRS-GdR PCHE

CEA-DAPNIA

# Themes

Neutrino Telescopes

Multi-messenger Astronomy ( 1st week )

Dark Matter ( 2nd week )

# Format

9 Courses ( $2 \times 1\frac{1}{4}$  hours)

15 General Presentations ( $\frac{3}{4}$  hour)

4 Workshops with differing formats

# Participants

96 total: 34 for 2 weeks, 27 for 1 week, 35 couple of days

24 students

50 experimentalists working on neutrino telescopes

46 astronomers, other experimentalists, theorists

# Courses

## $2 \times 1\frac{1}{4}$ hours

Cherenkov Telescopes for Gamma-Ray Astrophysics

Gamma Ray Astronomy from Space

Fermi Acceleration

High Energy Neutrino Telescopes - Physics and Techniques

Astrophysical Sources of High Energy Neutrinos

Cosmic Ray Data

Cosmology and Structure Formation

Dark Matter and Particle Physics

Underground Neutrino Experiments

W. Hoffman

J. Paul

G. Pelletier

C. Spiering

E. Waxman

S. Swordy

J. Silk

A. Bottino

S. Mikheyev

# General Presentations

$\frac{3}{4}$  hour

Gamma Rays Bursts

GRB Afterglows

The Multiwavelength Universe

Microquasars

Integral

Neutrino Emission from SNRs and Pulsars

SuperKamiokande

$\nu$  with MACRO: oscillation, dark matter and astronomy

Amanda

Status of the ANTARES Underwater Neutrino Telescope

The Baikal Neutrino Project: Status Report

Nestor

NEMO Project Status Report

Auger: a New Window into Ultra High Energy Cosmic Rays

EUSO: a Space Observatory for EHECR and Neutrinos

M. Boer

A. De Rujula

P. Von Ballmoos

F. Mirabel

P. Von Ballmoos

J.A. de Freitas Pacheco

L. Sulak

T. Montaruli

W. Rhode

P. Coyle

Zh.-A. Dzhilkibaev

S. Tzamarias

G. Riccobene

A. Letessier-Selvon

A. Bottai

# **Workshop on Multi-Messenger Astronomy**

## **(Informal on-going working group)**

### **Organisers : A. Barrau and D. Smith**

*Original objective:*

To gain familiarity with the established source catalogs:  
wavelength oriented (example, Egret, Markarian)  
or source oriented (SNR lists, quasar & blazar lists).

Two exercises were proposed to learn to use the catalogs:

- i) try to build an a priori neutrino candidate list
- ii) study the case of a bright Egret source where it took years to find a counterpart at other wavelengths.

*Further objective:*

Study gamma ray bursts as neutrino sources.

**Study room assigned, ~12 people**

# Workshop on HE Neutrinos: sources and fluxes

Organiser : V. Berezhinsky

25, 26 January

Overview

Neutrino Interaction with Matter

Nu-N and nu-e cross-sections

Neutrino-Nucleon Cross-Section in Extra Dimensions

TeV Gamma Radiation from Blazars

Shock acceleration to high and ultrahigh energies

On the Neutrino Flux from Gamma Ray Bursts: an Overview

Hidden High-Energy Neutrino Sources

Gamma Ray Bursts from the First Stars: Neutrino Signal

Atmospheric neutrinos

HE neutrinos from Superheavy DM

Mirror matter and HE neutrinos

Ultra High Energy Neutrino Z-Showering, GZK  $\nu$  and  $\tau$  Airshowers

V. Berezhinsky

M.H. Reno

A. Gazizov

M. Kachelriess

F.Aharonian

V. Ptuskin

D. Guetta

V. Dokuchaev

D. Guetta

P.Lipari

I. Tkachev

Z. Berezhiani

D. Fargion

**Sessions in Amphitheatre**

# Workshop on Km<sup>3</sup> Neutrino Detector (Informal on-going working group) Organiser : A. Capone

Cerenkov detection.

Present and future photon detectors for km<sup>3</sup> neutrino telescope

Study for a Km<sup>3</sup> detector in Capo Passero: mechanics, deployment, transmission.

Km<sup>3</sup> neutrino detector: example of deep underwater multidisciplinary laboratory.

Electronic equipment required for a Km<sup>3</sup> neutrino detector.

Slow control for a Km<sup>3</sup> neutrino detector

Development of a new electronics for the Km<sup>3</sup> neutrino detector.

Acoustic detection.

Radio detection.

L. Moscoso

S. Zavatarelli

R. Papaleo

G. Pavan

G.-J. Nooren

V. Bertin

D. Lo Presti

**Study room assigned, ~12 people**  
**Some sessions in Amphitheatre**

# Workshop on Dark Matter

Organiser : N. Spooner

30, 31 January

Dark Matter From Familons:

Detection of Dark Matter in  $\gamma$  Astronomy: Results and Prospects:

Liquid Xenon for WIMP Searches

Dark Matter Search in the EDELWEISS Experiment

The Cryogenic Dark Matter Search: Present Results and Future

The Large-Scale U.S. Dark-Matter Axion Search

AGAPE - MACHO search

AMS Potentialities in the Search for Dark Matter

WIMP Searches with Gamma Ray Telescopes

New Limits and Progress from the Boulby Dark Matter Programme

V. Burdyuzha

A Jacholkowska

R. Luscher

G. Chardin

L. Baudis

D. Kinion

Y. Le Du

C. Goy

P. Ullio

N. Spooner

**Sessions in Amphitheatre**



# Session Conclusions

## Friday 1 February

Summary of the Multi-messenger astronomy workshop	G. De Vries
Summary of the KM3 workshop	A. Capone
Plans for Particle Astrophysics in Europe	J.J. Aubert

# Session Record

Will put copies of transparencies on a web site

Speakers please send electronic version of presentations  
or give transparencies to be scanned

Will send CD copy to those who request it

# Schedule

7:30-8:30 Breakfast

9:00 Morning sessions start

12:30 Lunch

16:00/17:00 Afternoon sessions start ( see agenda)

19:30 Dinner

20:30/21:00 Evening sessions start ( see agenda)