

# The Environment Monitoring of the VIRGO antenna for gravitational wave detection

A. Anastasio<sup>1</sup>, F. Barone<sup>1,2</sup>, A. Eleuteri<sup>1</sup>, F. Garuffi<sup>1</sup>, L. Milano<sup>1,2</sup>

<sup>1</sup>Istituto Nazionale di Fisica Nucleare - Sez. Napoli,

Complesso Universitario di Monte S. Angelo - Edificio G - Via Cintia, I-80126 Napoli, Italia

<sup>2</sup>Dipartimento di Scienze Fisiche, Università di Napoli "Federico II"

Complesso Universitario di Monte S. Angelo - Edificio G - Via Cintia, I-80126 Napoli, Italia

**Abstract.** The Environment Monitoring System of the VIRGO antenna is a full modular system that can be easily adapted and extended to fulfil the present and future Virgo needs. This system already started data taking of temperature, pressure and acoustic noise for their identification.

## INTRODUCTION

The Environment Monitoring is the VIRGO system that monitors all the environmental quantities that may have effect on the interferometer output<sup>1</sup>. The environmental data flow together with the logical links among the Virgo systems is shown in Fig.1. In this figure it is possible to see that all the environmental data (including the quantities related to the buildings) are sent to the Frame Builder and the to the Data Distribution which provides also the historical monitoring.

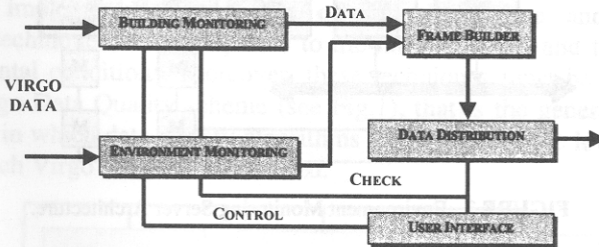


FIGURE 1. Environment Monitoring Data Flow.

## ENVIRONMENT MONITORING ARCHITECTURE

A client/server architecture has been chosen for this system, so that an User Interface is used for the check and the control of the apparatus<sup>2</sup>. In Fig.2 the global architecture of the Environment Monitoring System is shown, including the Buildings Monitoring section, while in Fig.3 the server architecture is shown.

The system is able to acquire different environmental noise sources at different sampling rates (i.e. electromagnetic noise [20kHz], acoustic noise [20kHz], seismic noise [1 kHz], temperature [0.1 Hz], pressure [0.1 Hz], humidity [0.1 Hz], etc.). Concentrated and/or distributed acquisition is possible according to the VIRGO needs.

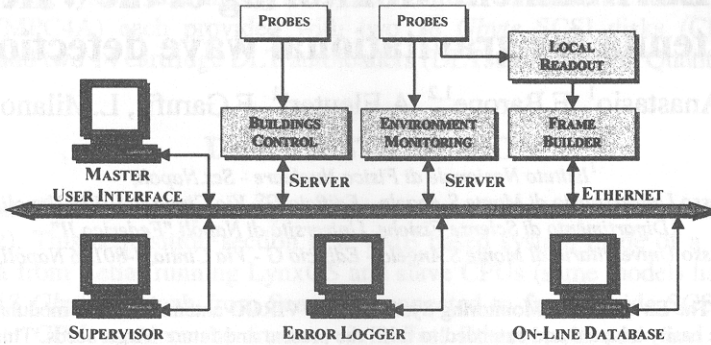


FIGURE 2. Environment Monitoring Architecture.

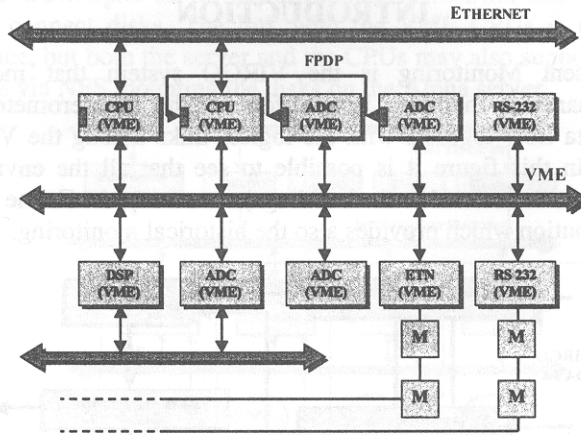


FIGURE 3. Environment Monitoring Server Architecture.

The system is now being intensively used for monitoring the temperatures of the Central Building, Mode Cleaner Building and of the mode cleaner suspension with a temperature accuracy already better than  $\pm 0.2^\circ \text{C}$ . Also an acoustic noise monitoring in the Central Building is started together with tests for seismic noise acquisition.

## REFERENCES

1. The Virgo Project, Final Design of the Italian-French large base interferometric antenna VIRGO for gravitational wave detection (INFN, Italy, and CNRS, France, 1989, 1992, 1995).
2. Barone, F., Calloni, E., Di Fiore, L., Grado, A., Milano, L., and Russo, G., Rev. Sci. Instrum. 67, 4353-4359 (1996).