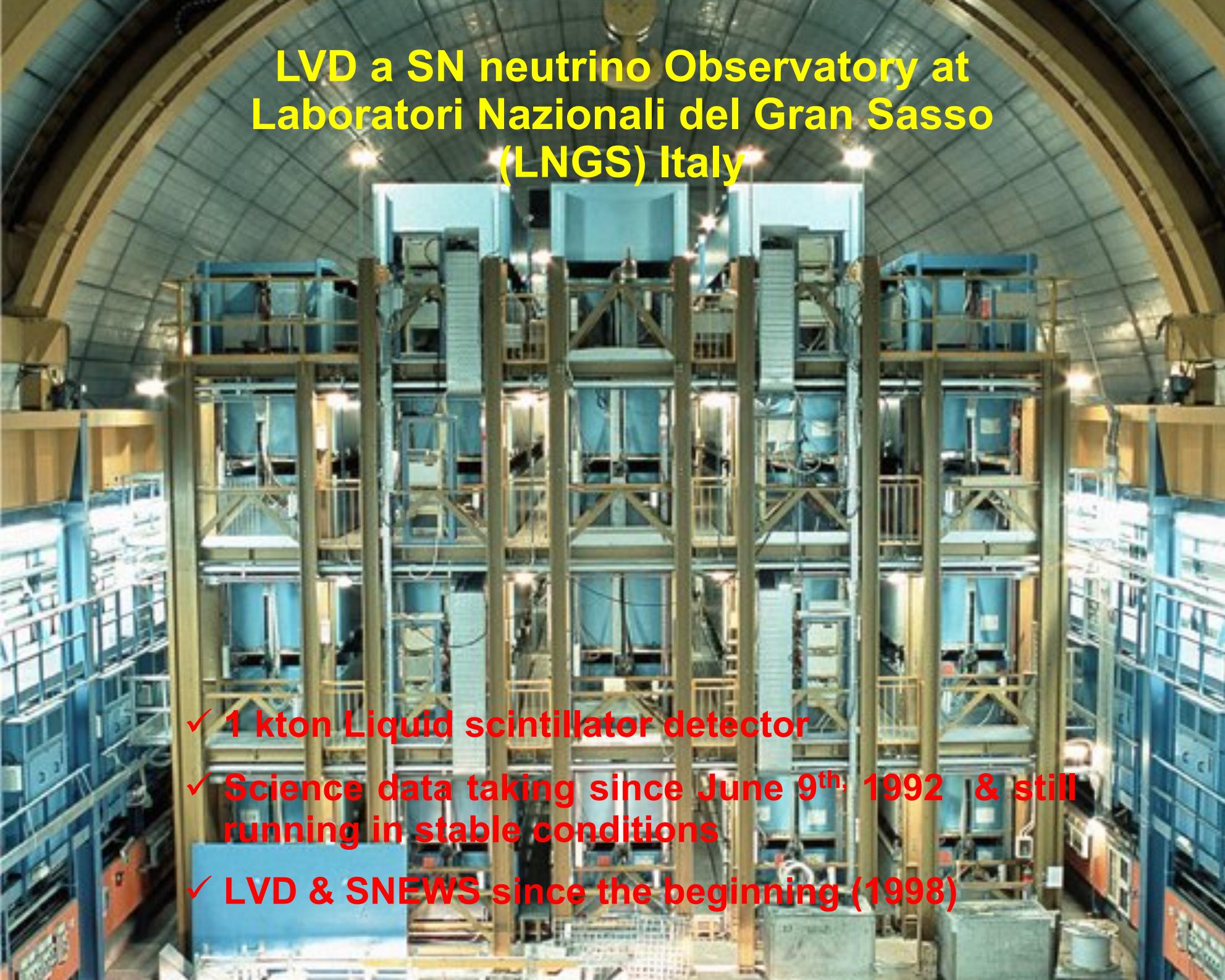


LVD STATUS REPORT

C. Vigorito
University & INFN Torino, Italy

On behalf of the LVD Collaboration

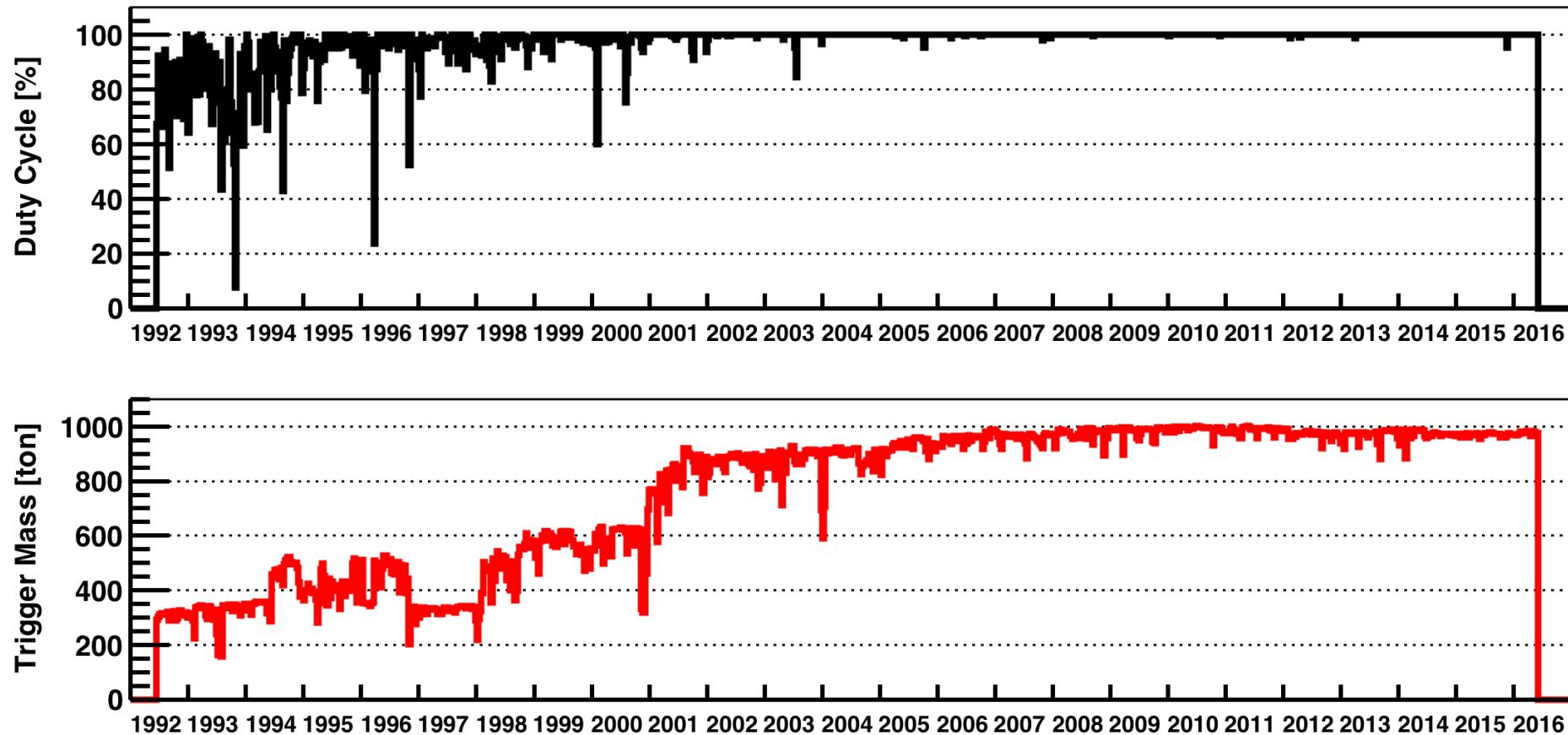
A photograph showing the interior of a large cylindrical detector hall. The structure is composed of numerous vertical blue rectangular panels, likely liquid scintillator modules, arranged in a grid pattern. The ceiling is a curved metal structure with several circular light fixtures. In the background, there are wooden walkways and various scientific equipment.

**LVD a SN neutrino Observatory at
Laboratori Nazionali del Gran Sasso
(LNGS) Italy**

- ✓ 1 kton Liquid scintillator detector
- ✓ Science data taking since June 9th, 1992 & still running in stable conditions
- ✓ LVD & SNEWS since the beginning (1998)



DETECTOR FACTS

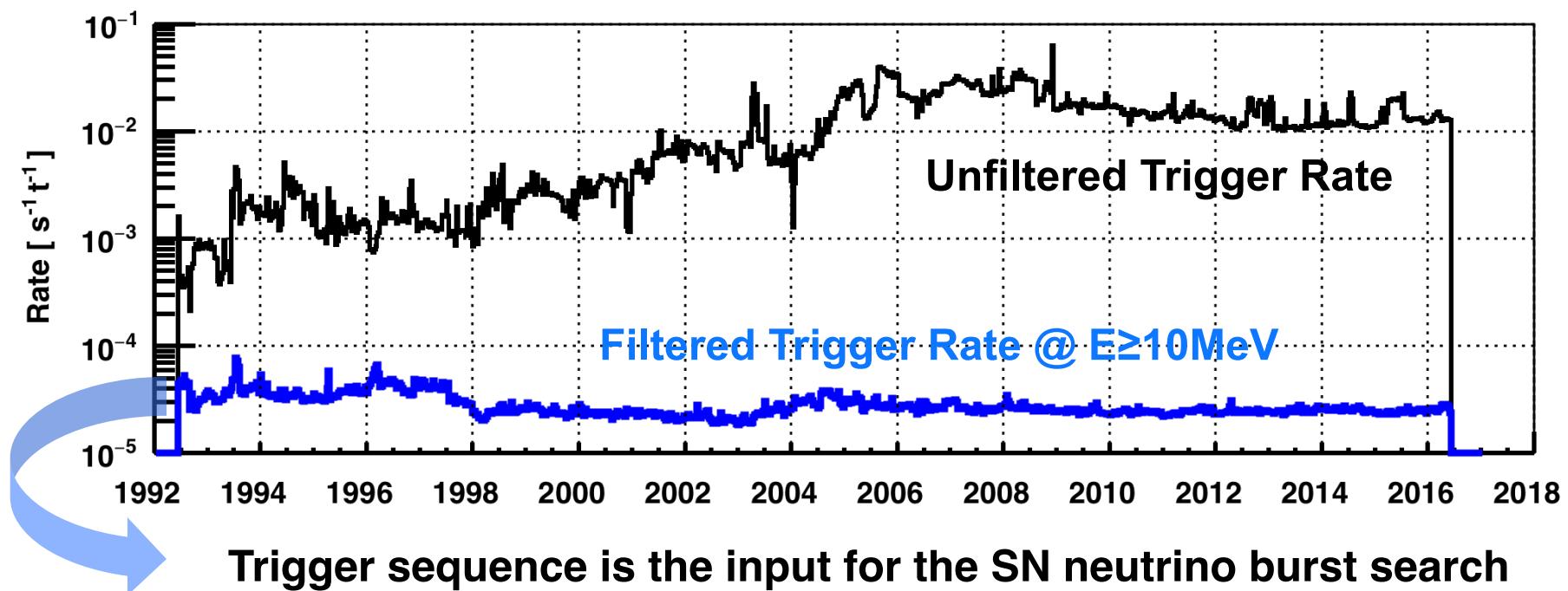


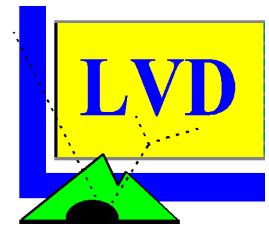
Duty cycle >99.5% since 2001

Livetime 8211 days [$M>300$ t]



TRIGGER RATE





**Summary on 21 years of data taking published in 2015
The Astrophysical Journal 802 (2015) 47**

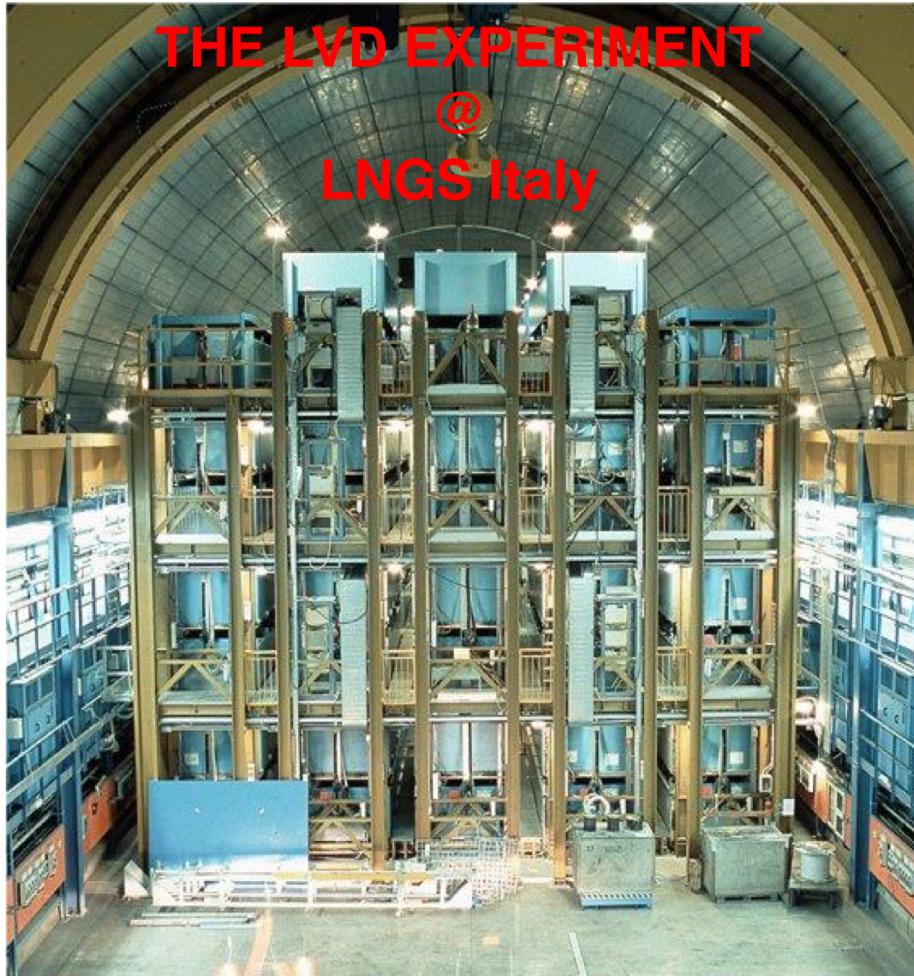
Updated analysis @ NEUTRINO 2016

P4.086

The Core Collapse Supernova Rate from 24 Years of Data of the Large Volume Detector

C.Vigorito et al.

University & INFN Torino / LVD Collaboration



1 kton scintillator detector running since 1992

100% efficient to ν -burst from Gravitational Stellar Collapse (GSC) in the Galaxy

No evidence of detection neither in standalone mode nor in coincidence with other detectors

Lowest upper limit to the rate of GSC event
0.1 year⁻¹ @ 90% c.l.

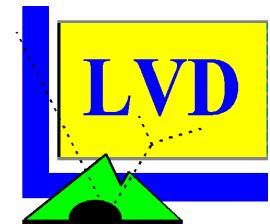


Poster session 4: Friday 8 July

XXVII INTERNATIONAL CONFERENCE ON NEUTRINO PHYSICS AND ASTROPHYSICS

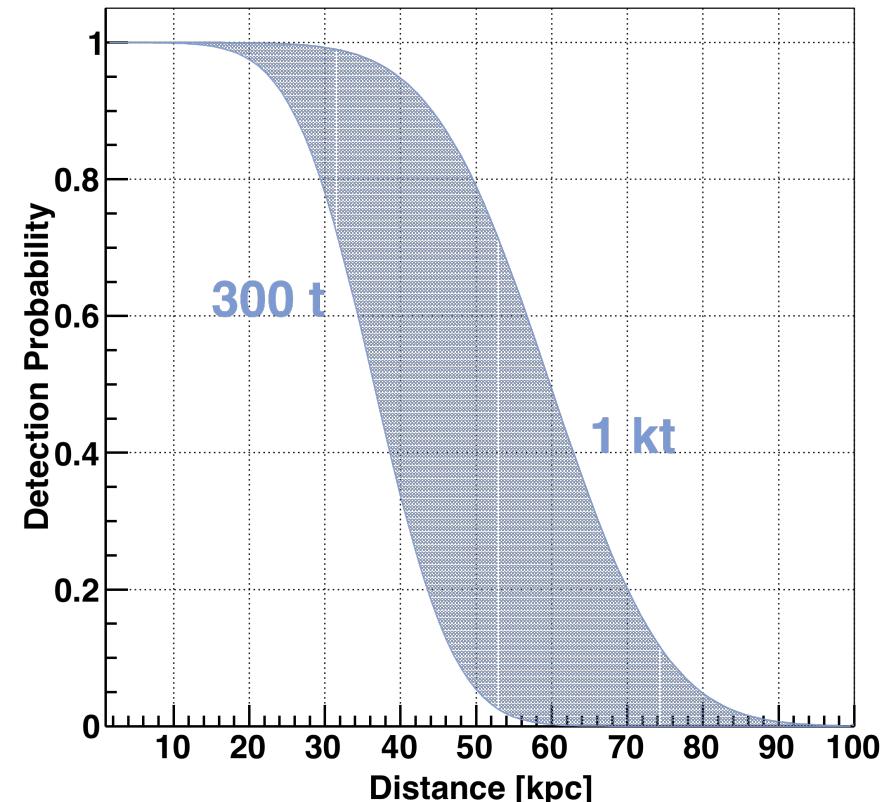
4–9 JULY 2016

SN NEUTRINO BURSTS SENSITIVITY



Normalized @ 10 kpc

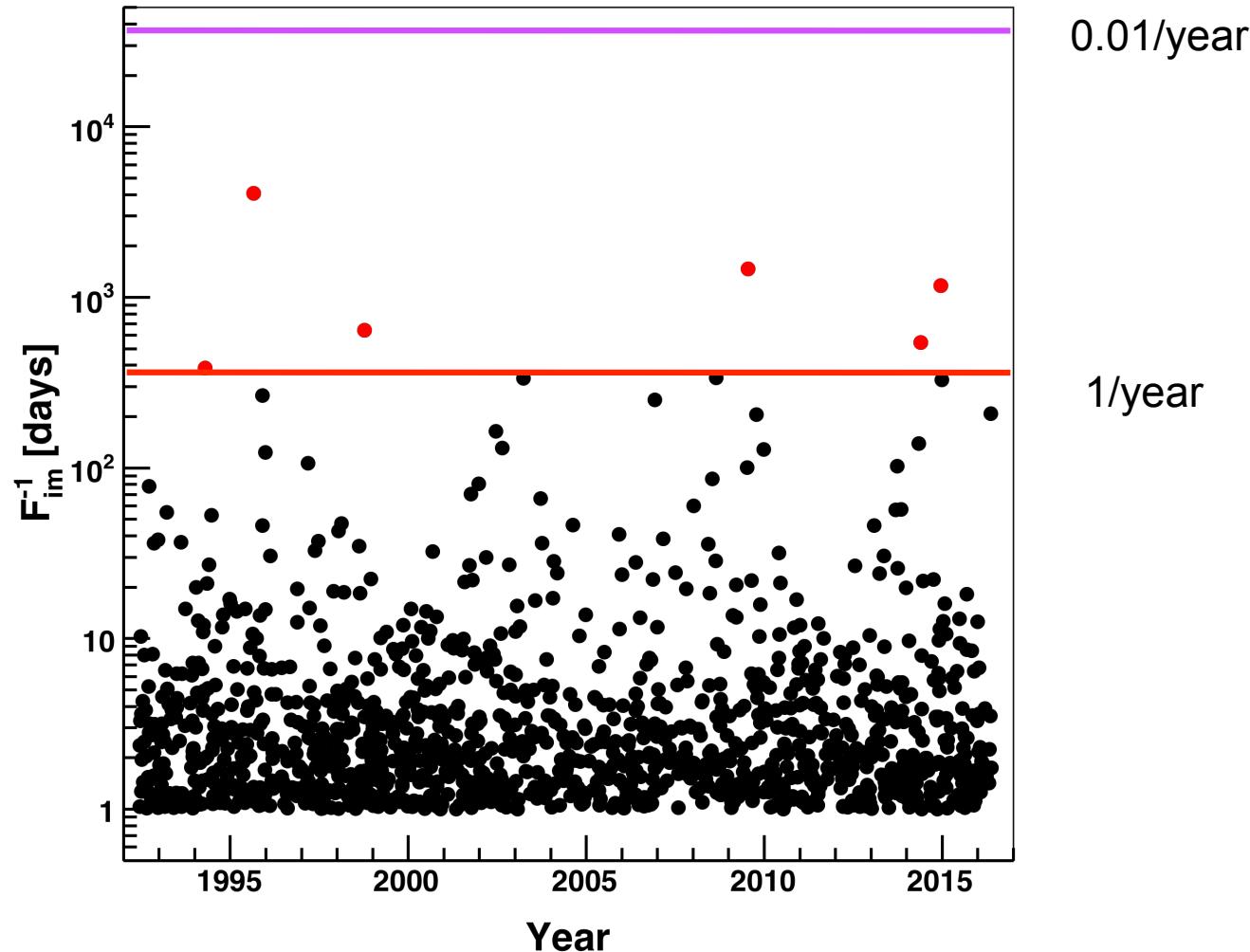
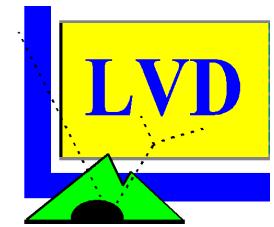
Neutrino interaction	Expected events
$\bar{\nu}_e + p \rightarrow e^+ + n$	250
$\nu_e + {}^{12}C \rightarrow {}^{12}N + e^-$	15
$\bar{\nu}_e + {}^{12}C \rightarrow {}^{12}B + e^+$	
$\nu_i + {}^{12}C \rightarrow \nu_i + {}^{12}C + \gamma$	10
$\nu_i + e^- \rightarrow \nu_i + e^-$	10
$\nu_e + {}^{56}Fe \rightarrow {}^{56}Co + e^-$	25
$\bar{\nu}_e + {}^{56}Fe \rightarrow {}^{56}Mn + e^+$	
$\nu_i + {}^{56}Fe \rightarrow \nu_i + {}^{56}Fe + \gamma$	
Total	300



Emission Model as in G.Pagliaroli et al.
APh 31 (2009) 163-176

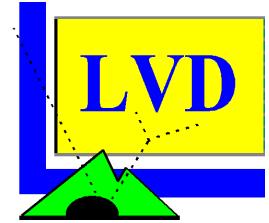
See details in ApJ 802 (2015) 47
LVD Collaboration

UPDATED RESULTS



Best experimental upper limit to ccSN events in our Galaxy: 0.1 year^{-1} (90% C.L.)

ONGOING ACTIVITIES



Study of the Muon Rate Modulation (~24 years)

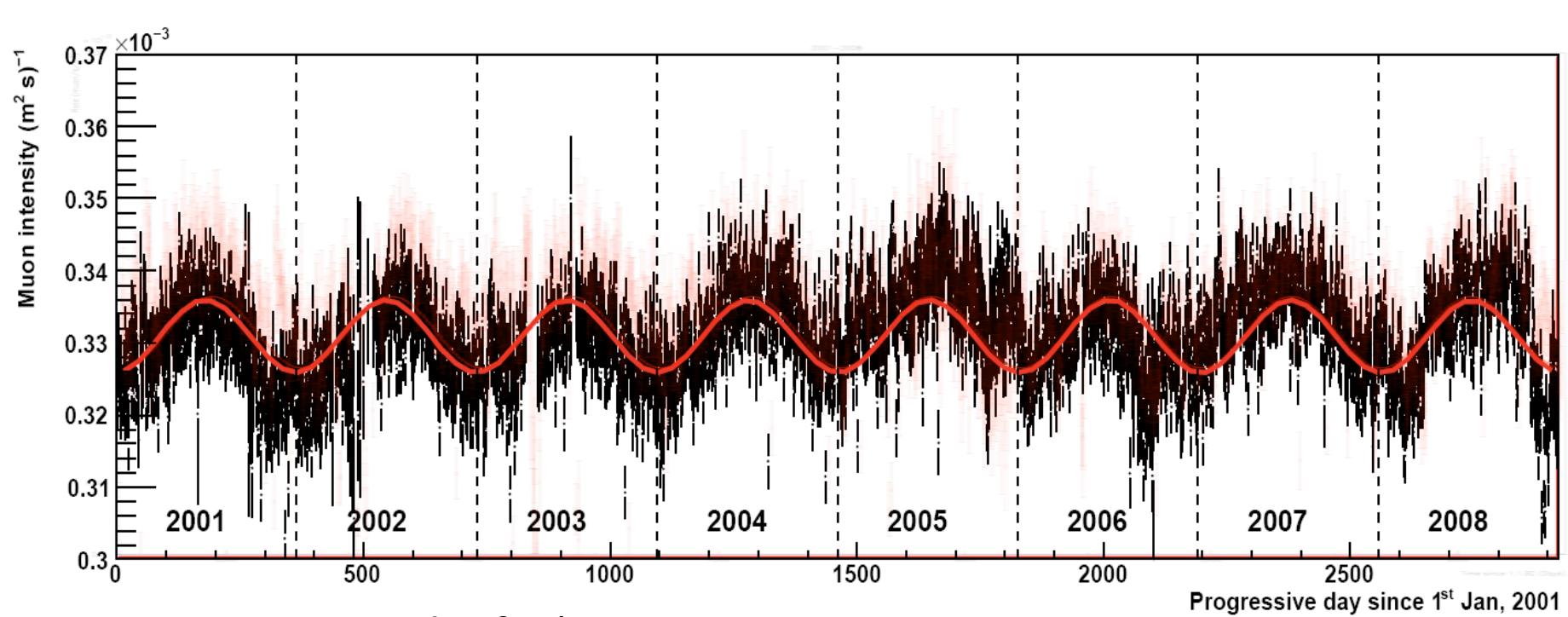
Study of the Muon Induced Neutron

Study of the Low Energy Background

LVD+

MUON RATE MODULATION

First analysis published in 2009 (ICRC), including all data after the detector completion (2001-2008)

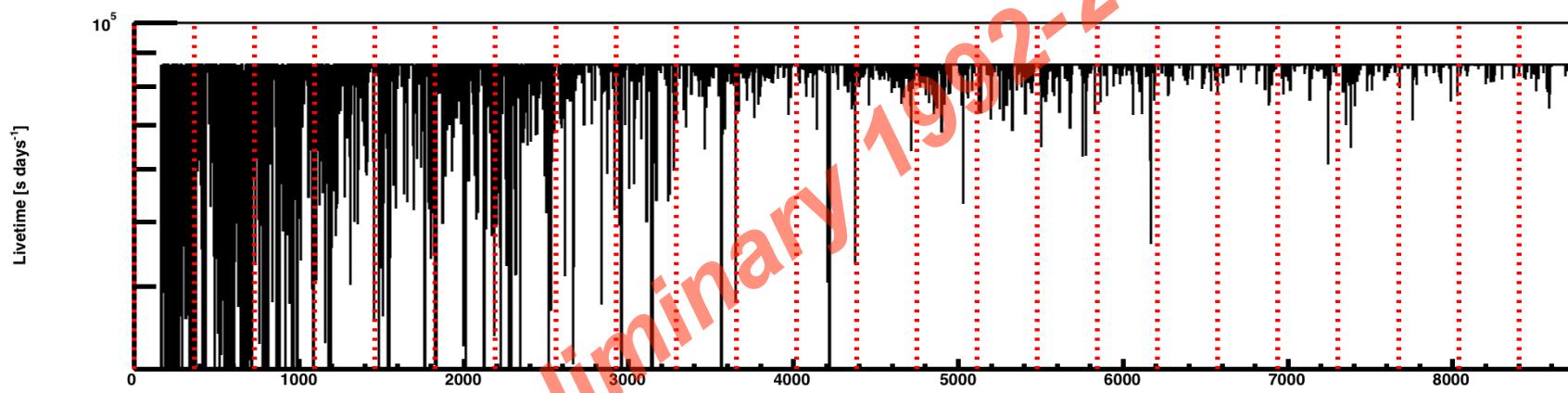
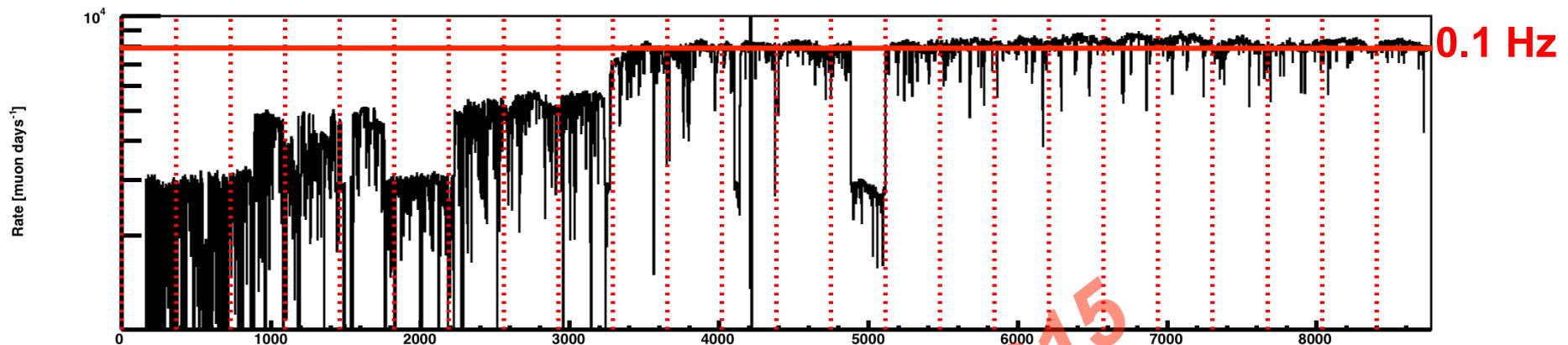


Rate: $(3.31 \pm 0.03) 10^{-4} \text{ m}^{-2} \text{s}^{-1}$

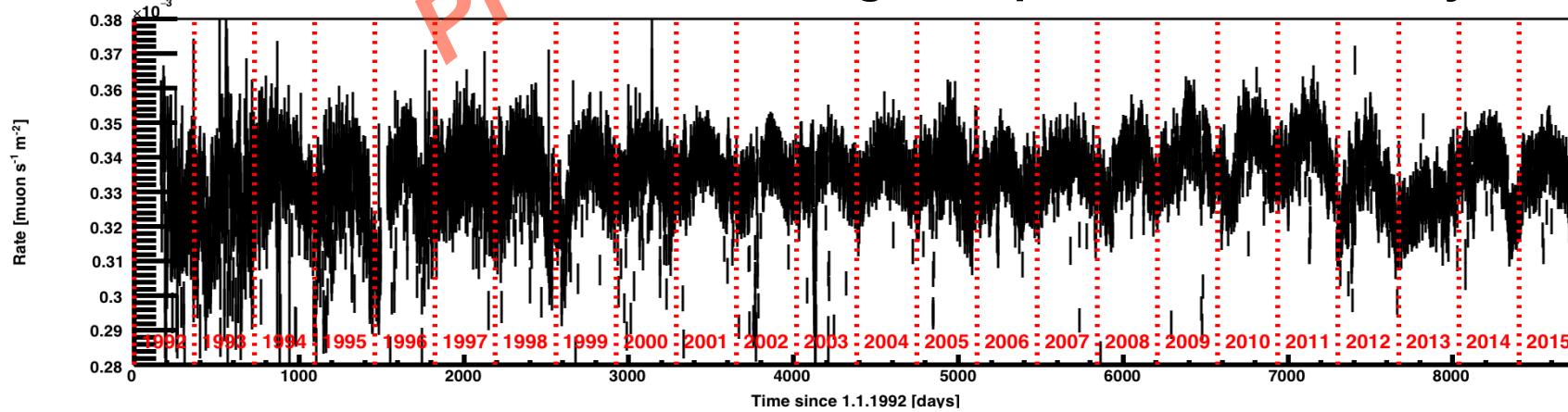
Period: compatible with 1 year

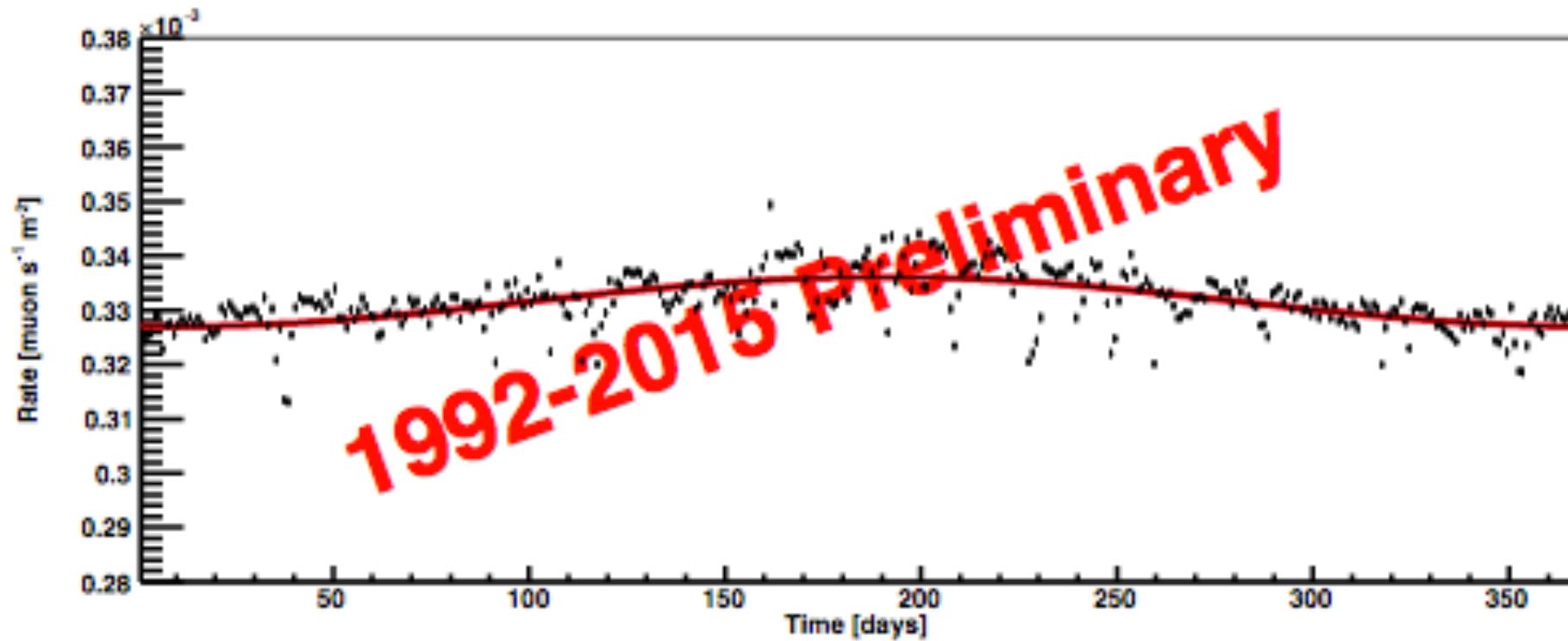
Phase: (185 ± 15) days

Amplitude: $(5.0 \pm 0.2) 10^{-6} \text{ m}^{-2} \text{s}^{-1}$



Including acceptance correction by MC





**Base rate and modulation (1.5 %) as well the phase are confirmed
Correlation with the effective temperature of the atmosphere is ongoing**