

# TAMA300 Overview

- Interferometric gravitational wave detector TAMA300  
Fabry-Perot Michelson interferometer with arm length of 300m

**Site:** National Astronomical Observatory of Japan (Tokyo, Mitaka)

**Laser Source:** 10W injection-locked LD-pumped Nd:YAG laser

**Mode Cleaner:** 10m-length ring-type cavity

**Main Interferometer:**

Michelson interferometer with Fabry-Perot arms of 300-m baseline length

Designed for power recycling with gain of 10

## Purpose of the project

To establish techniques needed for a future kilometer-class interferometer

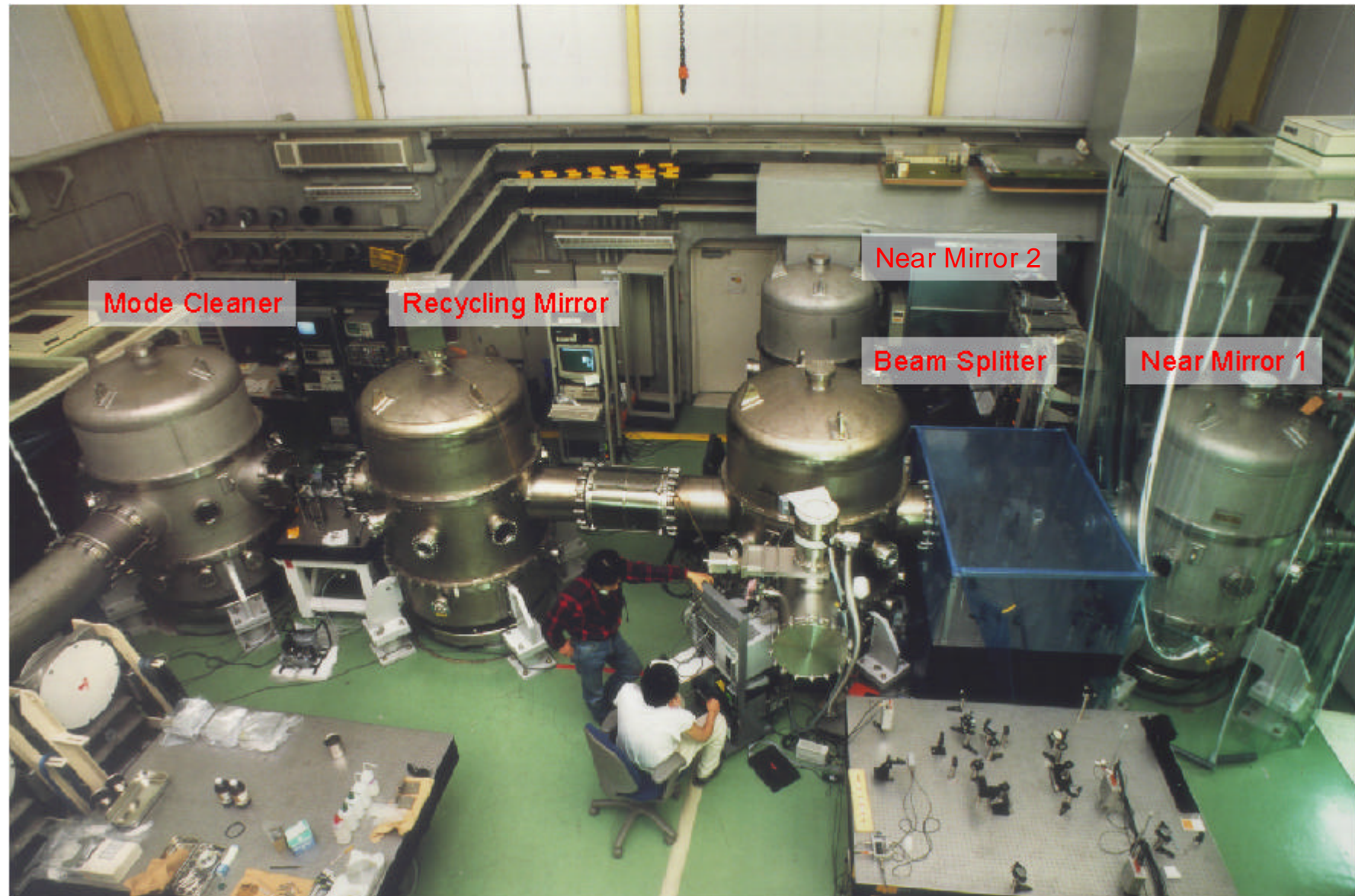
To detect possible events in galaxies nearby

Designed sensitivity ~  $h_{\text{RMS}} = 3 \times 10^{-21}$

# *Bird's view of the site*



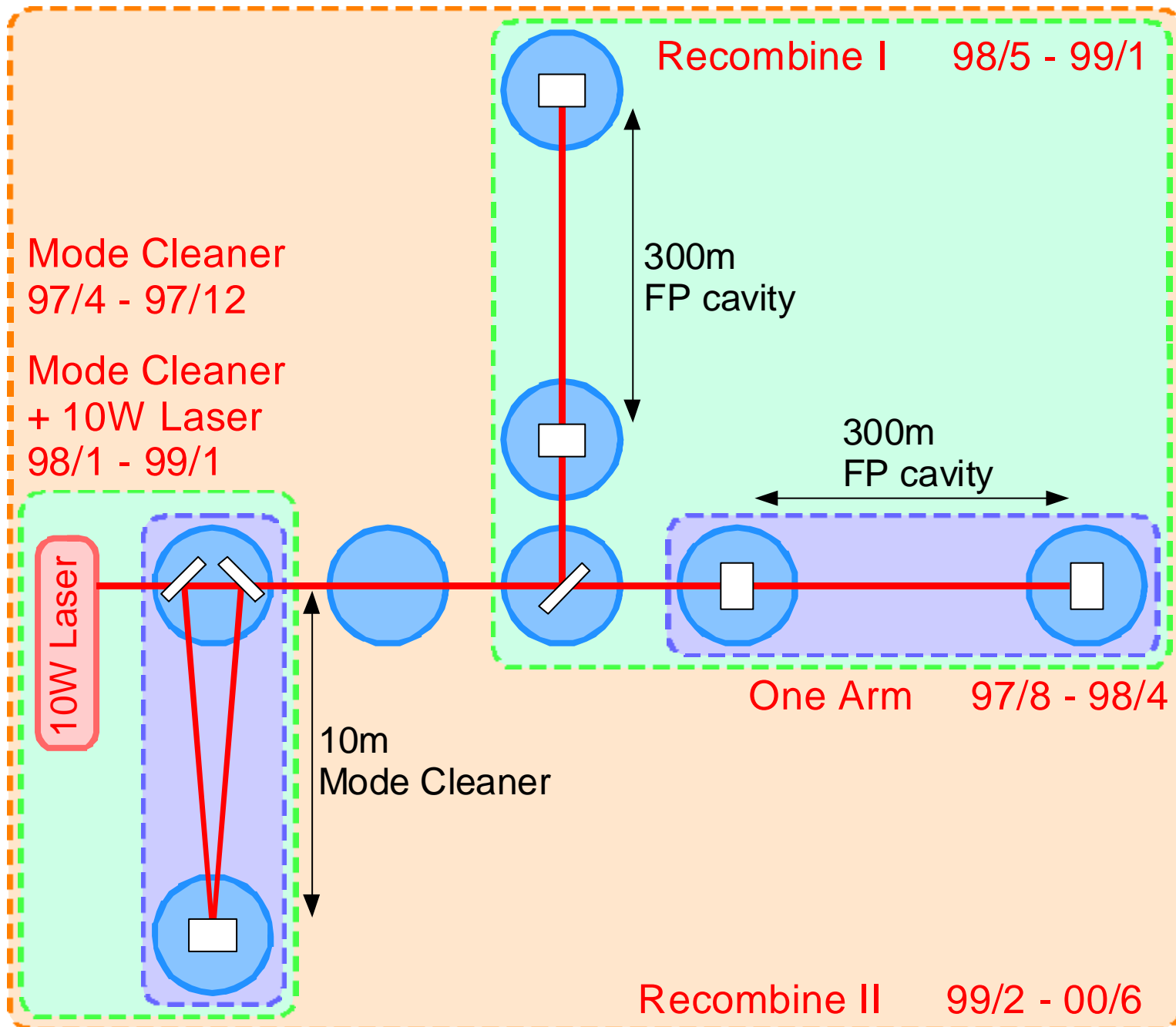
# Center room



# ***Vacuum duct of 300m length***



# Progress of TAMA300



Mode Cleaner  
97/4 - 97/12

Mode Cleaner  
+ 10W Laser  
98/1 - 99/1

Recombine I 98/5 - 99/1

300m  
FP cavity

300m  
FP cavity

One Arm 97/8 - 98/4

Recombine II 99/2 - 00/6

- 1995 Project started
- 1996 Facilities construction completed
- 1997 Vacuum system completed
- 1999/8 Data Taking 1 (engineering run) 10hours
- 1999/9 Data Taking 2 (first data run) 30hours
- 2000/4 Data Taking 3 16hours

# Current Status of TAMA300

## ● Data Taking(99/8, 9)

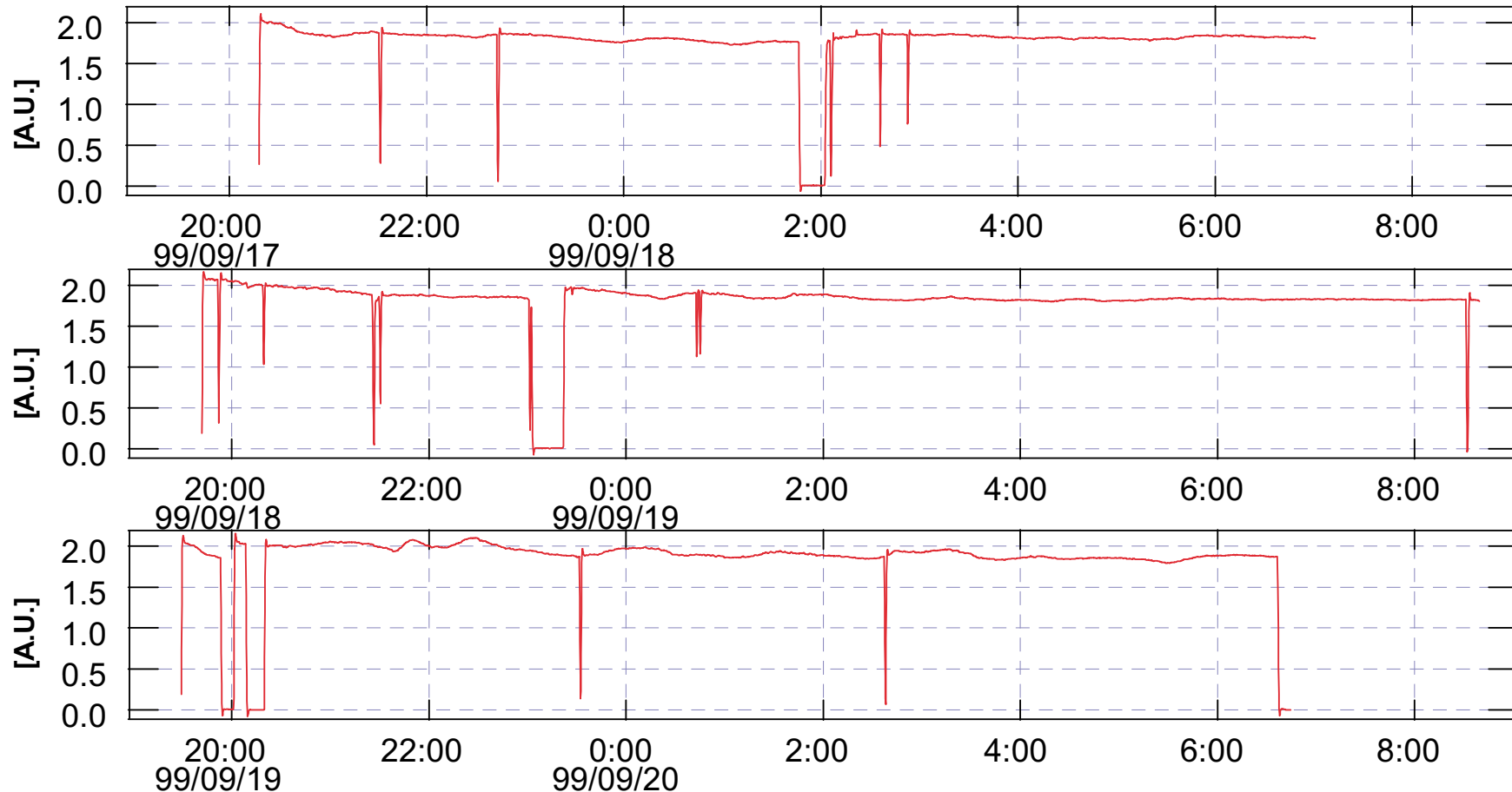
Data Taking 1 1999/8/6~8/7(1 night)

Data Taking 2 1999/9/17~20(3 night)

~  $1 \times 10^{-17}$  m/Hz<sup>1/2</sup>  $\Rightarrow$   $3 \times 10^{-20}$ /Hz<sup>1/2</sup>

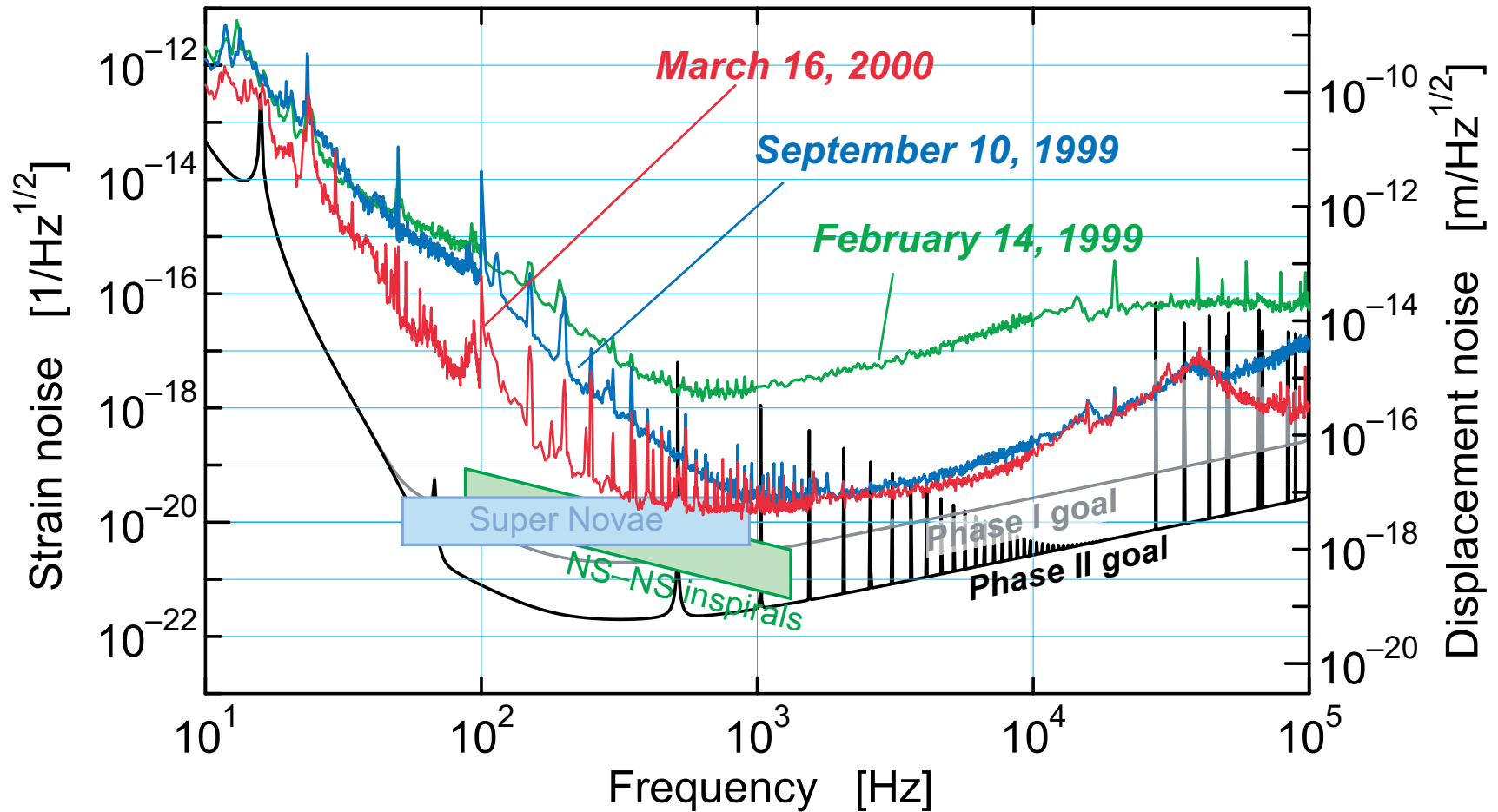
~ Longest lock stretch: 7h43m Total: 30hours

Light power  
inside the interferometer



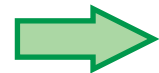
# Current status of TAMA300

- Improvement of the sensitivity



Best sensitivity

$$4 \times 10^{-18} \text{ m}/\text{Hz}^{1/2}$$



$$h = 1 \times 10^{-20} /\text{Hz}^{1/2}$$

# Identified noise sources

- Sensitivity-limiting-noises

Present noise sources are identified

In the observation band:

Alignment control noise & Noise from Michelson part

**Displacement noise level of TAMA300** (March 16, 2000)

