# Past, present and future underground detectors

$(\mu/\nu)_{atmospheric}$ $\nu$ solar $\nu$ SUSY DM $\nu$ SN PD DM

| Lab/Location | Year | Sensitive area /mass | Status |
|---|---|---|---|
| KGF (South India) | 1965 | | |
| CWI (South Africa) | 1965 | 174 $m^2$ | |
| BNT (Baksan, Caucasus) | 1978 | 260 $m^2$ | |
| SAGE I — III (Baksan, Caucasus) | 1988-91<br>1991 | 30 t of Ga<br>60 t of Ga | operates |
| HOMESTAKE (USA) | | | |
| IMB (USA) | | | |
| HPW (USA) | | | |
| KAMIOKANDE I — III (Japan) | | | |
| SUPER-KAMIOKANDE (Japan) | 1996 | | |
| NUSEX | | | |
| FREJUS | | | |
| LSD | | | |
| SOUDAN 1 | | | |
| SOUDAN 2 | | | |
| SNO (Canada) | 1998 | | |
| MACRO (Gran Sasso, Italy) | 1994 | | |
| LVD (Gran Sasso, Italy) | | | |
| GALLEX I — III (Gran Sasso, Italy) | 1991 | | |
| ICARUS (Gran Sasso, Italy) | | 4700 t of $^{40}Ar$ | |
| BOREXINO (Gran Sasso, Italy) | | | |
| | | | |
| | | | |

# Past, present and future underwater/ice detectors

$(\mu/\nu)_{atmospheric}$ $\nu$ astrophysical $\nu$ SUSY DM WIMP Monopole SM

| Lab/Location | Year | Sensitive area ($10^3$ m$^2$)*) | Status |
|---|---|---|---|
| **DUMAND I, II**<br>*Pacific near Hawaii Big Island at a depth of 4.5 km* | Historically first underwater project. Closed down…**) | | |
| **BAIKAL NT**<br>*Lake Baikal, East Siberia; at a depth of 1.1 km* | | | |
| NT-36 | 1993-95 | 0.15-0.20 | Stepwise deployment & going into operation |
| NT-72 | 1995-96 | 0.4-3.0 | |
| NT-96 | 1996-97 | 0.8-6.0 | |
| NT-144 | 1997-98 | 1.0-8.0 | |
| NT-200 | 1998 | 2.0-10.0 | Operates |
| **AMANDA**<br>*South Pole; depth=0.8-2 km* | | | |
| AMANDA A | 1994 | Small | Operates |
| AMANDA B | 1996 | 1.0 | Operates |
| AMANDA B4 | 1998 | 5-6 | Operates |
| AMANDA II | 2000 | 30-50 | Under construction |
| AMANDA KM$^3$ | 2005 | 1000 | Under discussion |
| **NESTOR**<br>*Ionian Sea near Pylos, Peloponnesos, Greece; at a depth of 3.8 km* | 2000 | 1st phase: 20<br>KM$^3$ in prospect | Under construction & test |
| **ANTARES**<br>*Mediterranean near Toulon, France; at a depth of 2.4 km* | 2000? | up to 100-200<br>KM$^3$ in prospect | Under discussion |
| **NEMO**<br>*Mediterranean, Italy; four appropriate sites are identified* | ? | up to 3500<br>KM$^3$ in prospect | Under discussion |

*) *The sensitive (effective) area is an increasing function of muon energy. For example, in the case of the Baikal NT-200, the estimated effective area is about 2300 m$^2$ and 8500 m$^2$ for 1-TeV and 100-TeV muons, respectively.*

**) *Some 1-string prototypes of the DUMAND array were deployed and several useful results were obtained.*