M.Aglietta et al., Nuovo Cimento C 12, 467 (1989)).

The LSD detector, located under Mt. Blanc, is 5.2 km.w.e underground. It has 72 tanks with dimensions 1.5 m × 1.5 m × 1.0 m filled with liquid scintillator. The detector is shielded by 2.5 cm iron slabs around each tank and an additional 98 cm layer of iron above the floor in order to decrease rock radioactivity. Each counter has 3 PMTs, in a 150 ns 3-fold coincidence. If any tank detects a signal greater than 5 or 7 MeV for internal or external tanks respectively, the electronic system is set to a lower threshold of 0.8 MeV for a gate lasting 500 μs. For each detected signal, the arrival time and the released energy are stored. Neutrons are detected through the capture reaction on the scintillator protons, resulting in a 2.2 MeV gamma emission with a characteristic time of 170 ± 10 μs. The tanks each have a neutron detection efficiency of about 60% for the 12 internal tanks used in this analysis. A muon event must have at least two tanks with 25 - 30 MeV energy released and be in coincidence within 200 ns. Each tank corresponds to a muon path of about 15 cm in the scintillator. The mean muon energy expected at this depth is 385 GeV.

The pulse multiplicity distribution and the pulse temporal distribution in the low-energy threshold gate (500 μs) are used to determine the number of neutrons/gate muon. The temporal distribution is fit by N(t) = N(0)e−t/τ + Nb where N(0) is a normalization constant, τ is the characteristic time, and Nb is the number of background counts in the counters. This fit gives 0.032 ± .003 neutrons/gate muon which is consistent with the multiplicity distribution. In order to get the mean number of neutrons/μ g cm−2, the number of neutrons/gate muon must be multiplied by the correction of production of neutrons from the iron on the floor and around the tanks and divided by the neutron detection efficiency in the scintillator, the mean path of the muon crossing one tank averaged over the 12 internal tanks used in the analysis, and the neutron detection efficiency. This yields (5.3 + 0.95 - 1.02) ×10−4 neutrons/muon/g/cm2.