

Nucleon Decay in Soudan 2

M. C. Goodman¹, for the Soudan 2 Collaboration
Argonne National Laboratory, Argonne Ill. 60439, USA

Abstract

The Soudan 2 detector is used to search for evidence of nucleon decay. Particular emphasis is put on searches for modes with multiple-charged particles in the final state, and for modes suggested by super-symmetric theories.

Mode	$\epsilon \times B$	BKG	Data	kT-yr	10^{30} yr	PDG98
νK^+				3.56	43	100
$K^+ \rightarrow \pi^+ \pi^0$	5.5%	1.1	0			
$K^+ \rightarrow \mu^+ \nu_\mu$	9.0%	0.4	1			
$p \rightarrow \mu^+ \mu^+ \mu^-$	31%	0.5	0	3.56	142	190
νK_S^0				4.41	59	86
$K_S^0 \rightarrow \pi^+ \pi^-$	17%	6.1	7			
$K_S^0 \rightarrow \pi^0 \pi^0 (3S)$	3%	3.4	7			
$K_S^0 \rightarrow \pi^0 \pi^0 (4S)$	5%	1.2	2			
$n \rightarrow \nu \pi^0$	11%	2.6	4	3.56	21	100
$n \rightarrow \nu \eta^0$	7%	0.7	0	3.56	32	54
$p \rightarrow \nu \pi^+$	4.6%	6.0	5	3.56	6.9	25
$n \rightarrow \nu e^+ e^-$	20%	1.6	1	3.56	68	74
$n \rightarrow e^+ \pi^0$	9%	0.9	0	3.56	38	550
$p \rightarrow e^+ K_S^0$				4.41	117	76
$K_S^0 \rightarrow \pi^+ \pi^-$	15%	0.61	1			
$K_S^0 \rightarrow \pi^0 \pi^0$	8%	0.42	0			
$p \rightarrow \mu^+ K_S^0$				4.41	151	64
$K_S^0 \rightarrow \pi^+ \pi^-$	16%	< 0.24	0			
$K_S^0 \rightarrow \pi^0 \pi^0$	6%	0.61	0			
$p \rightarrow e^+ K_L^0$	11%	3.5	2	4.41	51	44
$p \rightarrow \mu^+ K_L^0$	12%	0.37	0	4.41	83	44

Table 1: Nucleon Decay limits set by Soudan 2

The Soudan 2 collaboration has analyzed its contained event sample for the evidence of nucleon decay. Limits in a number of decay modes are shown in Table 1. Details about the analysis can be found in Allison et al., and Wall et al.

References

- Allison, W.W.A. et al., Phys. Lett. B427, 217 (1998).
Wall, D. et al., submitted to Physical Review, (1999).