

Status of ⁴⁸Ca double beta decay search with CANDLES

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• $\mathbf{0}_{\nu\beta\beta}$ search was conducted by using 130.4 days data.

•Analyses for selection of the $\mathbf{0}_{\nu\beta\beta}$ candidate events are followings;

- contamination in $CaF_{2}(sim)^{2}$ Not ²¹²Bi²¹²Po, not ²⁰⁸TI(see next section) 3) Event on CaF_2 position

result
130.4day
0.36(21CaF ₂)
0
1.02
>5.6 × 10 ²² year
2.7 × 10 ²² year

Results(details are shown in Ref 3)

• Expected BG event rate 10^{-3} events/keV/yr/(kg of ^{nat}Ca) was achieved \rightarrow low background condition! • There is no events in Q_{RR} region with high purity

•Obtained half-life limit was comparable to the most stringent value for ${}^{48}Ca(see table 1)$.

 Main backgrounds were radioactive contamination in CaF_2 (see next section)

•The observed energy spectrum around the Q_{RR} region Energy(MeV) was well reproduced by the simulation. (see fig. 4))

Ref 3: Phys. Rev. D103, (2021), 092008

	6. Summary
	•CANDLES is the detector system for ⁴⁸ Ca neutrino–less double beta decay
	 Measurement. We have obtained the first result from
	130.4 days measurement.
Jup	 The BG event rate 10⁻³
	events/keV/yr/(kg ot natCa) was
u I	•Obtained half-life limit was
5	comparable to the most stringent limit
	for ⁴⁸ Ca.
nal	 In order to reject main BG events(²⁰⁸Tl
1	and ²¹² Bi ²¹² Po), we will apply new
m	analysis(likelihood and CNN).
see	•By using 652 days data and new
	analyses, expected nait-life sensitivity
rra	•For future improvement, we started
nin	development for new techniques.
	enrichment : We found isotopic effect
	by using laser isotopic separation. Now
	we started system design to reach mass
<u>сл</u>	production ~lmol/year.
1.2 22)	•scintillating bolometer : We have
)	of scintillation and thermal signals
	from CaF _a . Energy resolution is
	affected by event position dependence.
	We started the censer design to avoid
···/	the position dependence.