Standard Proton Irradiation

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Irradiated boards:

1 - Laser measurements

2 - Standard oven

3, 4 - Preventive annealing

5, 6, 8, 9, 10 - Proton energy scan

7 - LM73 broken

11, 12 - Online Fwd/Rev annealing

13, 14 - Offline Fwd/Rev annealing

15, 16 - Spare

Analysis

Progress on analysis:


Laser measurements


Standard oven


Preventive annealing


Proton energy scan


Online Fwd/Rev annealing


Offline Fwd/Rev annealing

December 2023

To be irradiated boards:

150, 250, 350, 175, 275, 375
Laser measurements

2 Spare

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Fraction of damage definition

Very useful quantity that evaluates the damage recovery, comparing multiple sensors with different characteristics

Fraction of damage measured at selected V_bias

t_ann is the time of annealing

T_ann is the temperature of annealing

$$f_{\mathrm{d}}(\mathrm{V_{bias}}) = \frac{\mathrm{I}_{\mathrm{dark}}^{(\mathrm{t_{ann}},\mathrm{T_{ann}})}(\mathrm{V_{bias}}) - \mathrm{I}_{\mathrm{dark}}^{(\mathrm{new})}(\mathrm{V_{bias}})}{\mathrm{I}_{\mathrm{dark}}^{(\mathrm{irr})}(\mathrm{V_{bias}}) - \mathrm{I}_{\mathrm{dark}}^{(\mathrm{new})}(\mathrm{V_{bias}})}$$

Measure of current sensor damage

Normalisation to irradiated sensor damage

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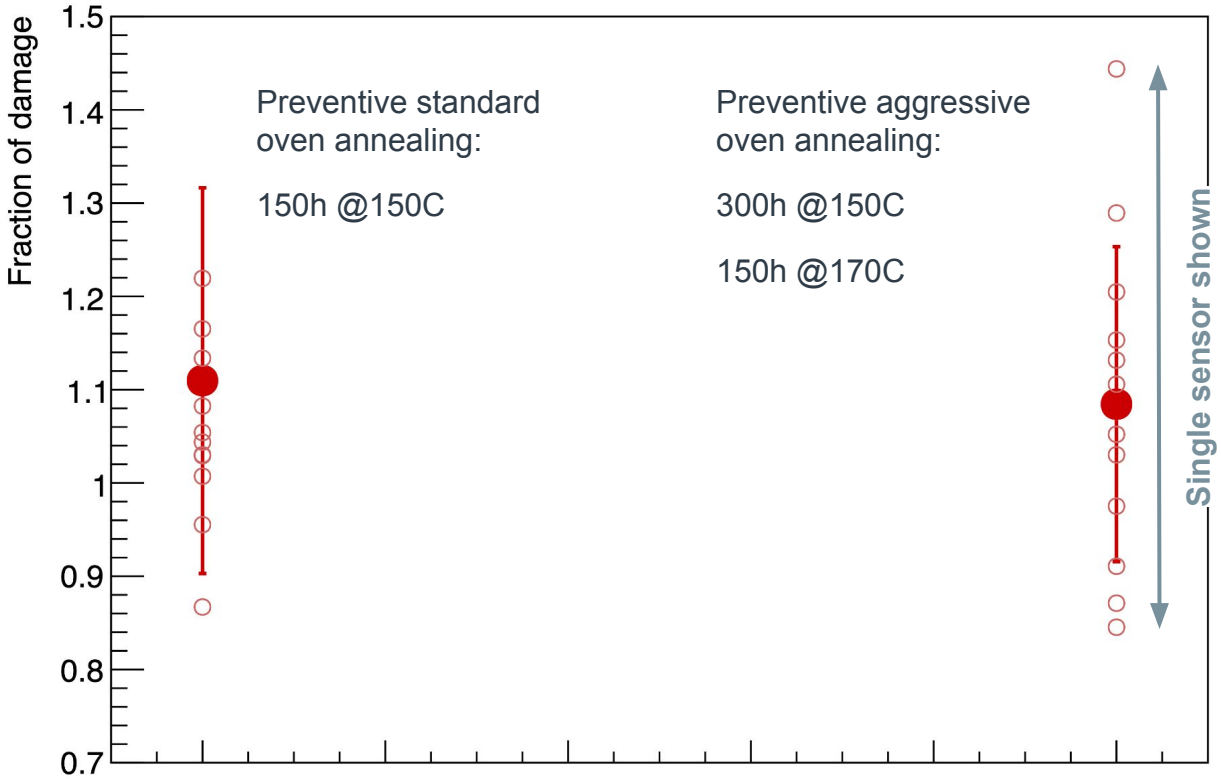
Preventive annealing

Preventive annealing seems, if anything, to worsen the DCR after irradiation. It does not seem to depend on the time or temperature



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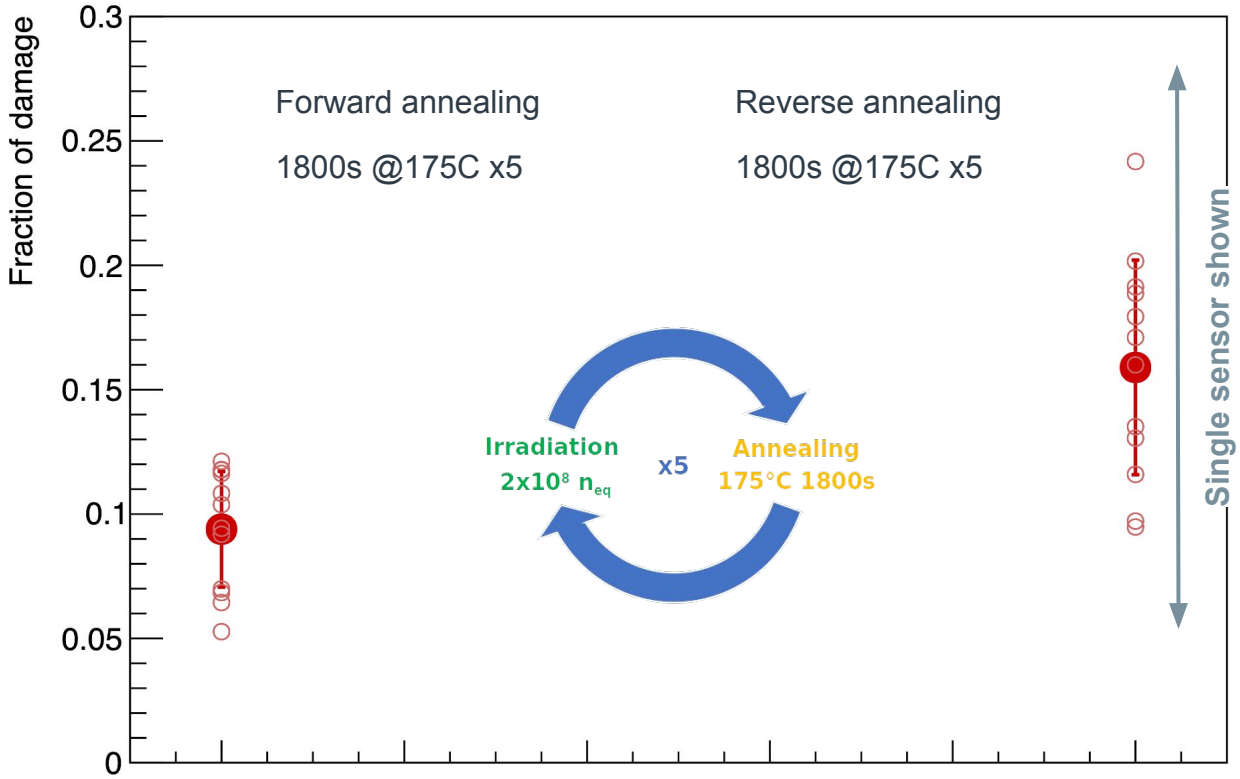
Online annealing

Very good recovery in a small time, reverse less effective



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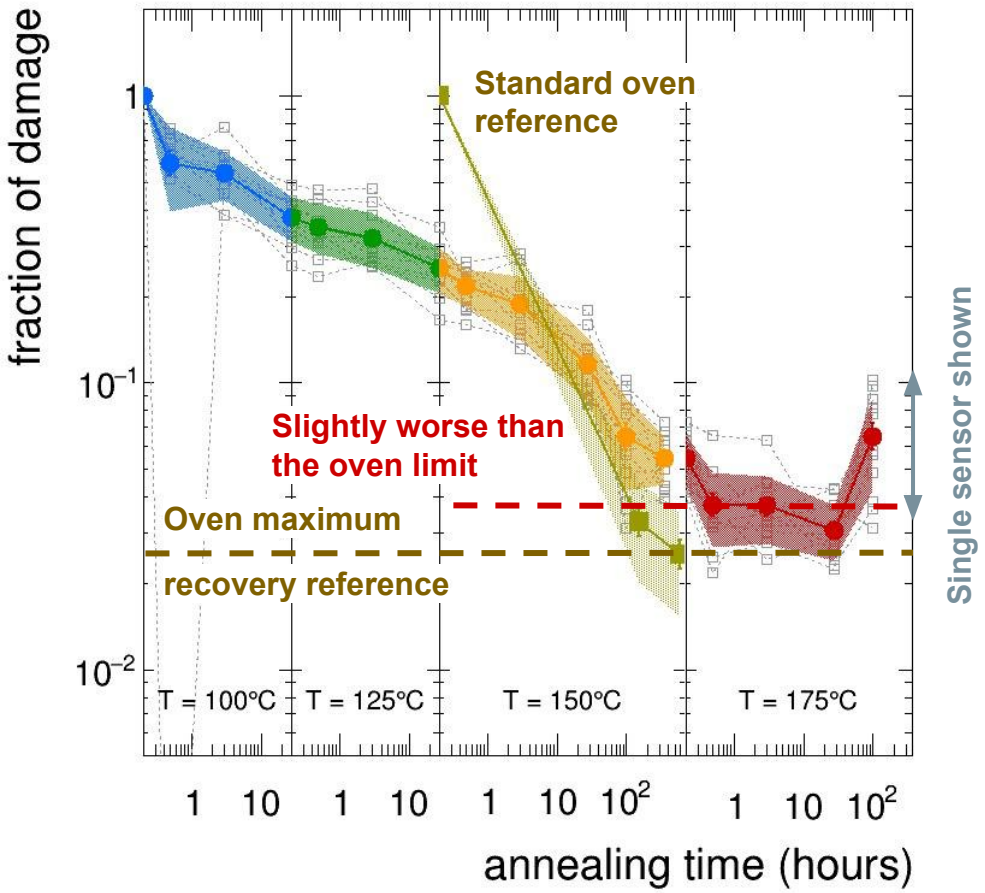
Offline Reverse annealing & Standard oven

Very good recovery in a small time, reverse less effective

Reverse method does not yield the maximum possible recovery after long and high-temperature annealing



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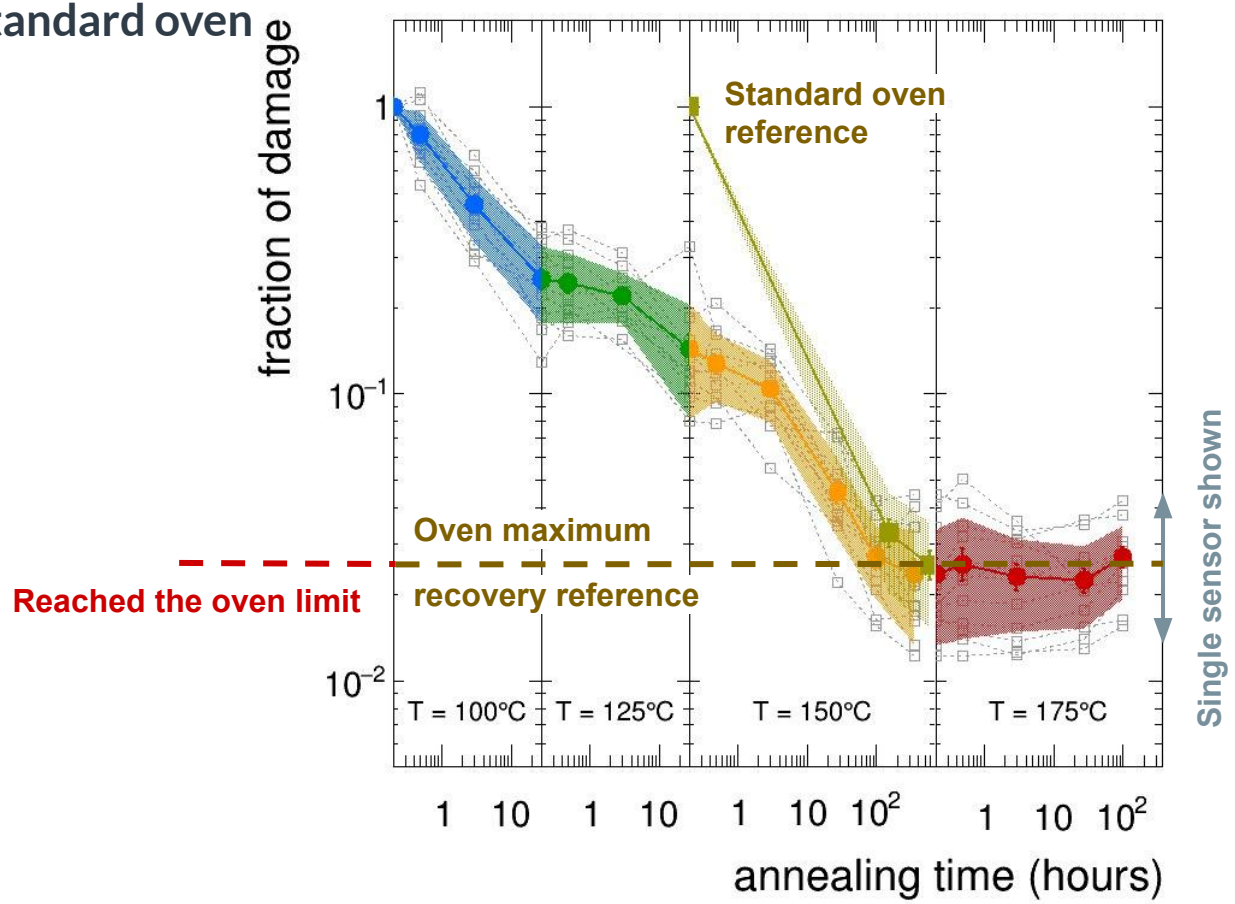
Offline Forward annealing & Standard oven

Very good recovery in a small time, reverse less effective

Forward method is very promising and yields the maximum possible recovery after relatively short time, without the need to go to 175C



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