[S1] **SMF perturbation and blocked electron flow**

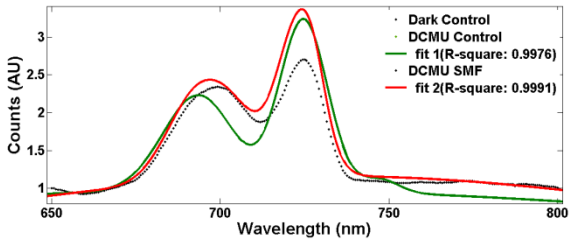


Fig.S1. Blocking the coupling between linear and cyclic electron flow with DCMU representing no energy transition from PSII to PSI and hence no photon capture phenomenon evidenced (green). SMF at this condition proved to be insensitive to the thylakoid membranes (red).

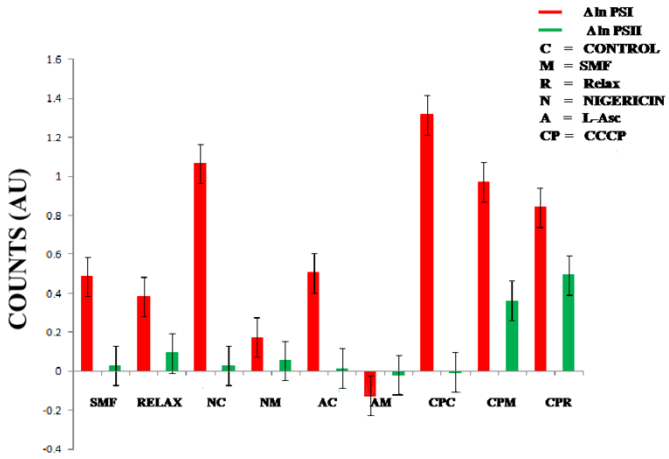


Fig.S2. Bar graph representing the SMF induced spin dependent correlated charge in the control and bio-energetically perturbed membrane components (PSI and PSII) emission profiles at cryogenic temperature. Red bars represent ΔlogPSI and green bars represents ΔlogPSII. The error bars representing the standard error for each replicated data.

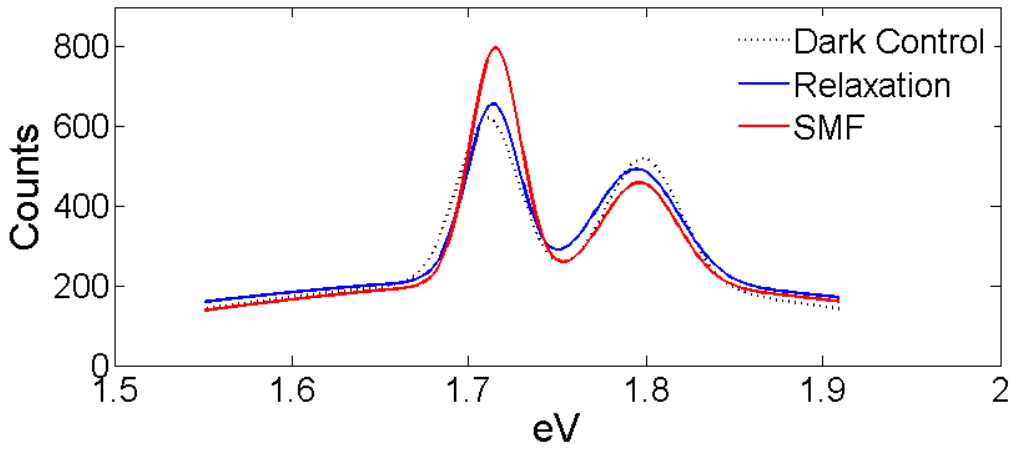


Fig.S3. Fitting parameters for dark control (model 1), relaxation (model 2) and SMF exposure (model 3) are described in the following paragraph

Parameter description for Fig. S3:

Dark control model1(x) =

a1*exp(-((x-b1)/c1)^2) + a2*exp(-((x-b2)/c2)^2) + a3*exp(-((x-b3)/c3)^2)

Coefficients (with 95% confidence bounds):

a1 = 410 (401.5, 418.4)
b1 = 1.711 (1.71, 1.711)
c1 = 0.02437 (0.02376, 0.02498)
a2 = 318.7 (310.7, 326.7)
b2 = 1.799 (1.798, 1.799)
c2 = 0.02984 (0.02895, 0.03072)
a3 = 214.3 (207.5, 221)
b3 = 1.731 (1.726, 1.735)
c3 = 0.2826 (0.2644, 0.3009)

Relaxation model2(x) =

a1*exp(-((x-b1)/c1)^2) + a2*exp(-((x-b2)/c2)^2) + a3*exp(-((x-b3)/c3)^2)

Coefficients (with 95% confidence bounds):

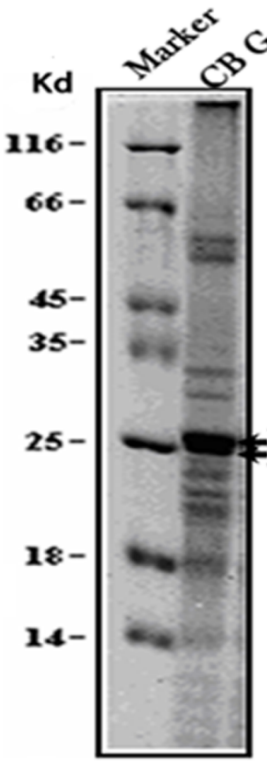
a1 = 439.3 (433.4, 445.2)
b1 = 1.714 (1.713, 1.714)
c1 = 0.02144 (0.02109, 0.02179)
a2 = 280.4 (275, 285.8)
b2 = 1.795 (1.795, 1.796)
c2 = 0.03392 (0.03317, 0.03467)
a3 = 219.4 (215.1, 223.6)
b3 = 1.741 (1.737, 1.745)
c3 = 0.3421 (0.3224, 0.3618)

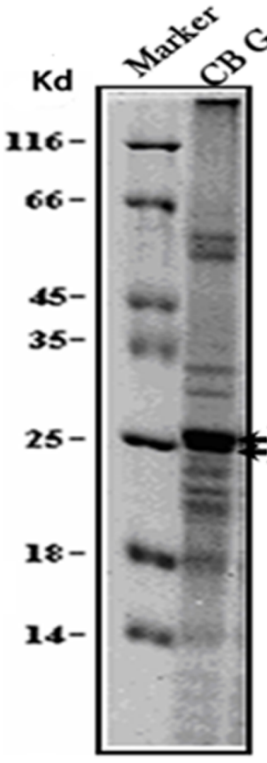
SMF exposure model3(x) =

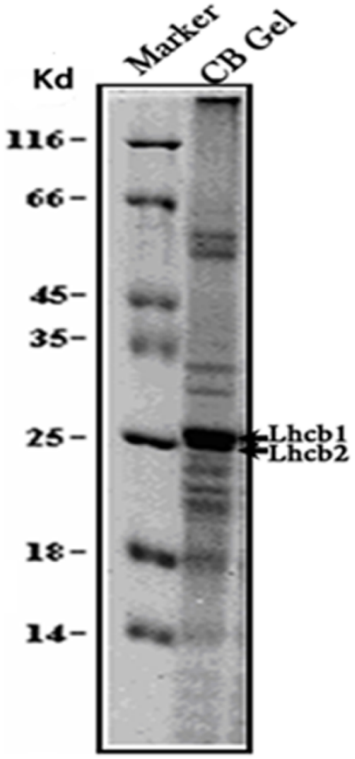
a1*exp(-((x-b1)/c1)^2) + a2*exp(-((x-b2)/c2)^2) + a3*exp(-((x-b3)/c3)^2)

Coefficients (with 95% confidence bounds):

a1 = 591 (585.2, 596.8)
b1 = 1.715 (1.715, 1.715)
c1 = 0.02041 (0.02017, 0.02066)
a2 = 254.4 (249.1, 259.6)
b2 = 1.797 (1.796, 1.797)
c2 = 0.03047 (0.02972, 0.03121)
a3 = 210.8 (206.7, 214.9)
b3 = 1.75 (1.747, 1.754)
c3 = 0.3103 (0.2953, 0.3253)



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CB Gel
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Lhcb1
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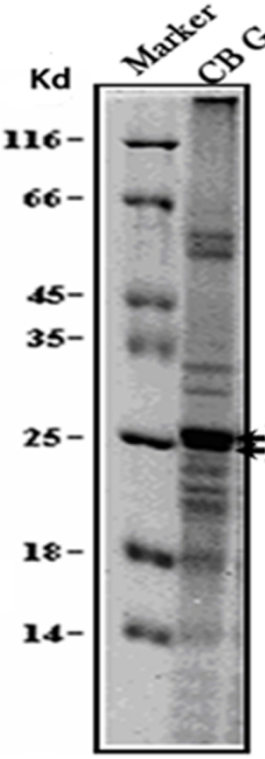
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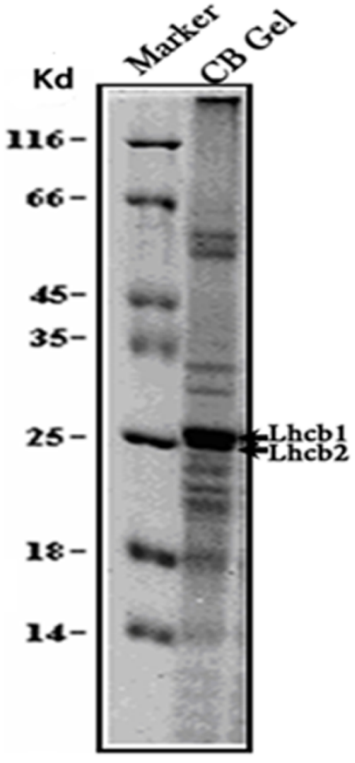
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