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Exact equality between dissipation and irreversibility RYOICHI KAWAI, University of Alabama at Birmingham, JUAN M. R. PARRONDO, Universidad Complutense de Madrid, CHRISTIAN VAN DEN BROECK, University of Hasselt — We show, through a reformulation of the Crooks theorem and the Jarzynski equality, that the average dissipation for a system perturbed to go from one equilibrium state to another one, is exactly given by $\langle W \rangle_{diss} = \langle W \rangle - \Delta F = kTD(\rho \| \widetilde{\rho}) = kT\langle \ln(\rho/\widetilde{\rho}) \rangle$, where ρ and $\widetilde{\rho}$ are the phase space density of the system measured at the same but otherwise arbitrary intermediate point in time, for the forward and backward process. $D(\rho \| \widetilde{\rho})$ is the relative entropy of ρ versus $\widetilde{\rho}$.

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