**Supplementary Material**

**Scale-Invariant Dissipation Underlies Enzyme Catalytic Performance**

Davor Juretić1,\* and Branka Bruvo Mađarić2

1 Faculty of Science, University of Split, Ruđera Boškovića 33, 21000 Split, Croatia; juretic@pmfst.hr or davor.juretic@gmail.com

2 Department of Molecular Biology, Ruđer Bošković Institute,Bijenička Cesta 54, 10000 Zagreb, Croatia; Branka.Bruvo.Madjaric@irb.hr

\* To whom correspondence should be addressed. Email: davor.juretic@gmail.com

Supplementary Material has five chapters. **The first** chapter contains Extended Methods with ten equations. **The second** chapter is essential for the paper because it is tied to the supplementary Excel database named Dataset-S1-75 with a complete set of all forward and backward microscopic rate constants for 75 enzyme-catalyzed reactions. It also provides Table S1 as an additional clarification for the meaning of the 30 columns from the dataset. **The third** chapter describes preliminary phylogenetic analysis for eukaryotic and bacterial cyclophilins. The results of that analysis are enclosed in Figure S1. **The fourth** chapter offers the names of 17 home-made FORTRAN source codes we constructed for this work and describes their output. The remaining 58 source codes can be downloaded from the Juretić (2025) publication in the Entropy journal. All 17+58=75 codes are needed to reproduce the calculated data from our Dataset-S1-75 and the simulated data used to find the maximal free-energy dissipation for each of the 75 reactions and corresponding optimal performance parameters. **The fifth** chapter contains all references mentioned in the Supplementary Material, regardless of whether they are already mentioned in the main text. Here is the list of chapters:

1. Extended Methods
2. Dataset-S1-75 description and Table S1
3. Preliminary phylogenetic analysis and Figure S1
4. Description of source codes and their output
5. References