**Title:**

**Health and disease imprinted in the time variability of the human microbiome**

**Running Title:**

**Microbiota, are you sick?**

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**Abstract:**

**Human microbiota plays an important role in determining changes from health to disease. Increasing research activity is dedicated to understand its diversity and variability. We analyse 16S rRNA and whole genome sequencing (WGS) data from the gut microbiota of 97 individuals monitored in time. Temporal fluctuations in the microbiome reveal significant differences due to factors that affect the microbiota such as dietary changes, antibiotic in- take, early gut development or disease. Here we show that a fluctuation scaling law describes the temporal variability of the system and that a noise-induced phase transition is central in the route to disease. The universal law distinguishes healthy from sick microbiota and quantitatively characterizes the path in the phase space, which opens up its potential clinical use and, more generally, other technological applications where microbiota plays an important role.**

### word-count (WC) = 135/250

**Importance**: (it is very important to write this in a proper way)

###WC = 120/150

**Keywords**: microbiome, systems biology, ecological modelling, community composition, stability

**Introduction**

**Material and Methods**

**Results**

**Discussion**

**Acknowledgements**

All hail the hipnotoad!

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**Conflict of Interest**

Authors declare that there are no competing financial interests in relation to the work described here.