GRAPHS ON INTEGER COMPOSITIONS AND MUSICAL SCALES

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A *composition* of a positive integer $n \geq 1$ is a sequence of positive integers $(n_1, \ldots, n_k)$ such that $n = n_1 + \cdots + n_k$. Let $\mathcal{C}_n$ be the set of all compositions of n, and then let $\mathcal{C} := \bigcup_{n \geq 1} \mathcal{C}_n$ be the combinatorial class of all integer compositions (see [3]). This class is combinatorially isomorphic to the class of all musical scales (see [1]). We will explain how to construct certain graphs taking $\mathcal{C}$ as the vertex set. Then we will use such graphs to construct a thermodynamic model, similar to the Ising model (see [2]), to classify scales according to multiple properties.

References

[1] R. Gómez-Aíza. Symbolic dynamical scales: modes, orbitals, and transversals. J. Math. Music. 17 (2023), no. 1, 46–64.

[2] S. Barbieri, R. Gómez, B. Marcus and S. Taati. Equivalence of relative Gibbs and relative equilibrium measures for actions of countable amenable groups. Nonlinearity 33 (2020) 2409-2454.

[3] P. Flajolet and R. Sedgewick. Analytic Combinatorics. Cambridge University Press (2009).