Fermi–Dirac statistics

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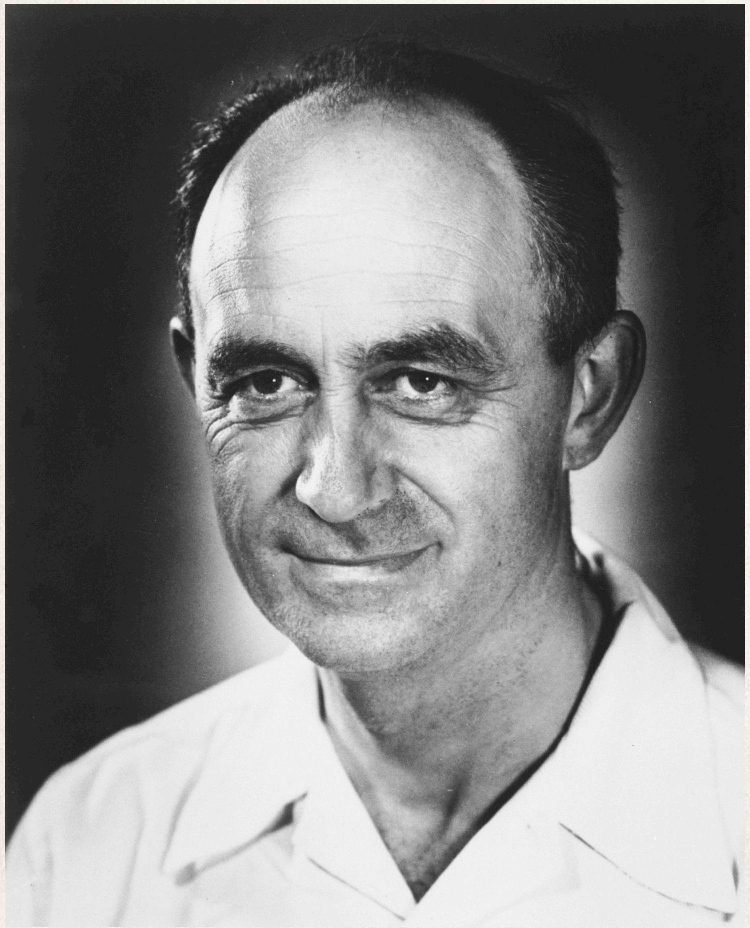

Random placement of n balls in r urns

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no urn can contain more than one ball? Pauli exclusion principle

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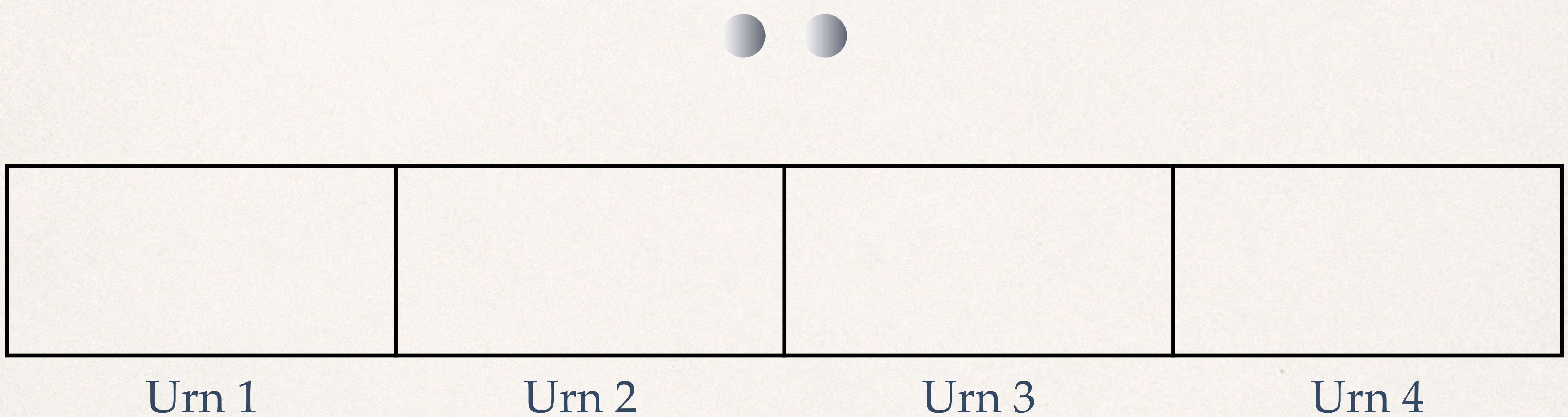

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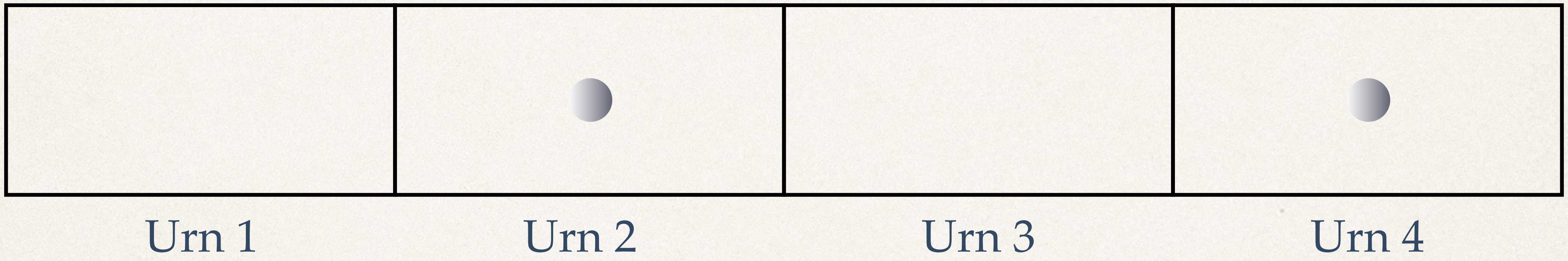

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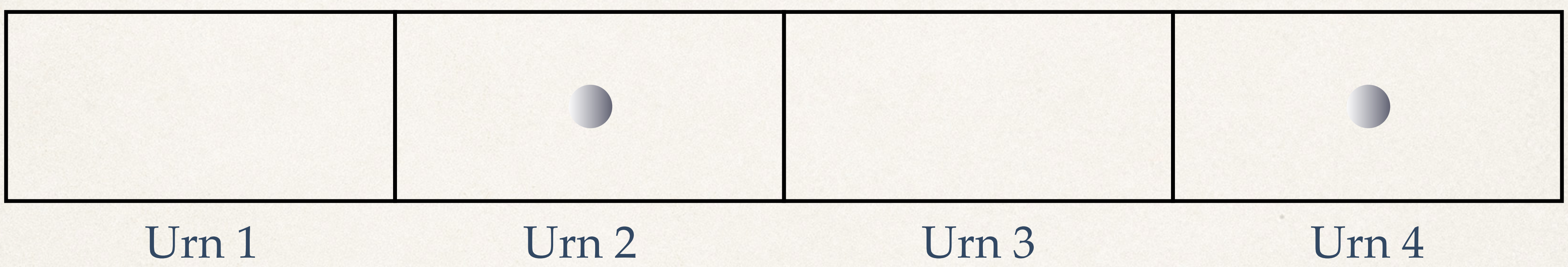

Number of distinguishable configurations : $\binom{4}{2}$ $\binom{r}{n}$

Fermi–Dirac statistics

Given a random deployment of n indistinguishable balls into r distinguishable urns so as to satisfy the Pauli exclusion principle, the probability of obtaining a given occupancy configuration $(k_1, k_2, \ldots, k_r)$ is given by

$$P(k_1, k_2, \ldots, k_r) = \frac{1}{\binom{r}{n}} \qquad \begin{pmatrix} k_1, k_2, \ldots, k_r \in \{0, 1\} \\ k_1 + k_2 + \cdots + k_r = n \end{pmatrix}.$$

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