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Blobbed topological recursion of the $\lambda\phi^4$ matrix model

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We consider an $N \times N$ Hermitian matrix model with measure $d\mu_{E,\lambda}(\Phi) = \frac{1}{Z}\exp(-\frac{\lambda N}{4}\mathrm{tr}(\Phi^4))d\mu_{E,0}(\Phi)$ where $d\mu_{E,0}$ is the Gau\ss{}ian measure with covariance $\langle \Phi_{kl}\Phi_{mn}\rangle = \frac{\delta_{kn}\delta_{lm}}{N(E_k+E_l)}$ for given $E_1, ..., E_N > 0$. We explain how this setting gives rise to two ramified coverings x, y of the Riemann sphere strongly tied by $y(z) = -x(-z)$ and a family $\omega_{g,n}$ of meromorphic differentials. We provide strong evidence that the $\omega_{g,n}$ obey blobbed topological recursion due to Borot and Shadrin. A key step is to extract from the matrix model a system of six meromorphic functions which satisfy interwoven Dyson-Schwinger equations. Two of these functions are symmetric in the preimages of x and can be determined from their consistency relations. Their expansion at ∞ gives global linear and quadratic loop equations for the $\omega_{g,n}$. These global equations provide the $\omega_{g,n}$ not only in the vicinity of the ramification points of x but also in the vicinity of all other poles located at opposite diagonals $z_i + z_j = 0$ and at $z_i = 0$.

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