

# Distance- $k$ graphs of random $d$ -regular graphs

Tulio Gaxiola, CIMAT, Mexico.

Joint work with Octavio Arizmendi, CIMAT, Mexico.

**Abstract.-** We calculate the distribution, with respect to the vacuum state, of the distance- $k$  graph of a  $d$ -regular tree. We show that the asymptotic distributions of distance- $k$  graph of the  $d$ -regular tree, as  $d$  tends to infinity, is given by the distribution of  $P_k(s)$ , where  $s$  is a random variable obeying a semicircular law and  $P_k$  is the  $k$ -th Chebyshev polynomial of second kind. We also find the asymptotic spectral distribution of the distance- $k$  graph of a  $d$ -regular random graph, when  $d$  is fixed, and the number of vertices tends to infinity.