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Understanding individual human mobility patterns MARTA C. GONZÁLEZ, Northeastern University, CESAR A. HIDALGO, Notre Dame University, ALBERT-LÁSZLO BARABÁSI, Northeastern University and Notre Dame University — Understanding human mobility patterns is of major importance for a number of areas, ranging from urban planning to traffic forecasting, transportation geography, and preventing the spread of biological and mobile viruses. Yet, in the absence of tools to monitor the time resolved location of a large number of individuals, our understanding of the basic laws governing human trajectories remains limited. Here we study the individual mobility pattern of mobile phone users whose position is tracked in a time resolved manner. We find that the displacement distribution of the whole population can be approximated with a truncated Lévy statistics, in agreement with earlier measurements. We show, however, that the main contribution to the observed distribution comes from the differences in the travel pattern of individuals. Furthermore, we find that the individual trajectories are bounded in space and are highly anisotropic, an effect that increases with the trajectory's radius of gyration. After we correct for differences in the radius of gyration and anisotropy all individuals are described by the same universal mobility pattern. These results open new avenues for modeling human motion, with important impact on agent based modeling, epidemic prevention, emergency response and urban planning.

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