related to each other by a discrete symmetry, the corresponding quantum eigenstates appear in almost degenerate doublets. When such symmetry-related regular objects are separated by a large "distance" in the classical phase space, the direct "coupling" between the corresponding eigenstates is strongly suppressed, and does not fully account for the observed splitting. In such conditions, the splitting is dominated by a different process, generally referred to as the "chaos-assisted tunneling." There, the wave packet, initially localized at one of the regular structures, tunnels through the dynamical barrier to the nearest "edge" of the chaotic "sea" and then propagates classically to the neighborhood of the other, symmetry-related, regular structure, instead of tunneling all the way through in a single step. We develop a theory of chaos-assisted tunneling in deformed microdisc resonators. We apply the method to the calculation of the splittings of the eigenstates, localized near the "bow-tie" stable periodic orbit, and demonstrate a quantitative agreement between the theory and numerical calculations. These results indicate, that the chaos-assisted tunneling is relevant for the anomalously large splittings, observed in recent experiments with novel semiconductor lasers with deformed microdisk resonators.

**14:42**

**I25 2 Signature of dynamical localization in the lifetime distribution of wave-chaotic dielectric resonators** O. A. STARYKH, *Yale Univ* PH. JACQUOD, *Yale Univ* E. E. NARIMANOV, *Bell Labs* A. D. STONE, *Yale Univ* We consider the effect of dynamical localization on the lifetimes of the resonances in open wave-chaotic dielectric cavities. We show that dynamical localization leads to a log-normal distribution of the resonance lifetimes which scales with the localization length in excellent agreement with the results of numerical calculations for open rough microcavities. This suggests quantitative experimental signatures of dynamical localization in semiconductor lasing microcavities.

**14:54**

**I25 3 Distribution of Lyapunov exponents of classical and quantum Sinai billiards.** DANIEL L. MILLER, *Intel Electronics Ltd., P.O.Box 3173, Jerusalem 91031, Israel* Two particles propagating along the same trajectory of the chaotic system (in our case the Sinai billiard), will diverge exponentially if they was a bit apart at the very beginning. The divergence rate is called the Lyapunov exponent and it is not the same for finite length trajectories. We have computed analytically the distribution of Lyapunov exponents together with other elements of the so-called tangent map. The tangent map is introduced for quantum particles also, and we have computed the quantum corrections to Lyapunov exponents. They are actually small in spite of qualitative change of the character of motion: classical mechanics forbids zero values of Lyapunov exponent and quantum mechanics allows them.

**15:06**

**I25 4 Classical and quantum implications of ray splitting*** REINHOLD BLUMEL, *Wesleyan University* Ray splitting is a universal phenomenon that occurs in the short-wavelength limit of all wave systems containing internal boundaries at which the system properties change abruptly. On the classical level this entails the existence of non-Newtonian periodic orbits. Wave mechanically the presence of ray splitting influences the mean and fluctuating parts of the level density. Semiclassical and quantum results concerning the mean and fluctuating parts of the energy spectra of various ray-splitting systems are presented. The prospects of actual experimental measurements of some specific ray-splitting phenomena are discussed.

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**15:18**

**I25 5 Quantum chaos in typical systems: Have we learned anything?** ROLAND KETZMERICK, *Max-Planck-Institut für Strömungsforschung and Universität Göttingen, Germany* Typical Hamiltonian systems have a phase space consisting of chaotic as well as regular regions. Chaotic dynamics in a mixed system is quite different from chaotic dynamics in a fully chaotic system, e.g., chaotic trajectories are trapped close to regular regions for power-law distributed time intervals. The search for quantum signatures of this dynamical behavior is still in its infancy, as methods and results from fully chaotic and integrable systems are hardly usable. Recent results on conductance fluctuations, resonance width distributions, and eigenfunctions will be presented and their relevance for transport through quantum dots will be discussed.

**15:30**

**I25 6 Microwave ionization of hydrogen Rydberg atoms: 3D computations** THOMAS CLAUSEN, *Wesleyan University* REINHOLD BLUMEL, *Wesleyan University* The problem of hydrogen Rydberg atoms in a strong microwave field is a classic in the study of quantum chaotic systems. Using a parallel computer cluster (PCC-Weswulf) recently assembled by the authors at Wesleyan University, we reproduce numerically ionization curves measured over the past two and a half decades by P. M. Koch and his collaborators at Stony Brook. The ionization process is analyzed in detail. The existence of narrow ionization spikes is predicted.

**15:42**

**I25 7 Organization and bifurcations of planar closed orbits of electrons in hydrogen atoms in crossed electric and magnetic fields*** D.M. WANG, J. DELOS, *College of William and Mary* We studied the patterns of creation and splitting of planar closed orbits of electrons in hydrogen atoms in crossed electric and magnetic fields. These orbits lie in the plane perpendicular to the magnetic field, and they start and end at the nucleus. Using a Poincaré map to study the regular motions, we observed that the bifurcations of planar closed orbits fall into an ordered sequence as energy changes: a "tangent bifurcation" creates one closed orbit that splits into two; subsequently, one of them becomes periodic, and splits by a "pitchfork bifurcation" into two periodic orbits and one closed orbit. To understand this ordered sequence of bifurcations, we created a model Hamiltonian which generates a twist map. This twist map gives a simple interpretation of the sequence of the bifurcations. Based on these calculations, we classified the closed orbits in families. Each family has some periodic member with a rational winding ratio which we use as the family name. We name the members of the family with a label which reflects their individual properties.

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