Poster Quiz QSIT Meeting Arosa 2011

Name:

1. Measurement of Statistical Nuclear Spin Polarization in an Ensemble of Self-Assembled Quantum Dots. What is the estimate of statistical spin-excess in a quantum dot containing 10^6 nuclei?	
a) 10^5	
b) 10^3	x
c) 10	
2. Accuracy of the mesoscopic capacitor as a single electron source What are the physical quantities considered to evaluate the accuracy of the quantum capacitor?	
a) the average current	
b) the noise power spectrum	
c) the full counting statistics	x
3. A novel geometry for nuclear magnetic resonance force microscopy - In this novel geometry for nuclear magnetic resonance force microscopy, what is the angle between the cantilever and external magnetic field?	
a) 90 degree	x
b) 45 degree	
c) 180 degree	
4. Fabrication of suspended graphene What is the benefit of using LOR for suspending graphene as compared to using a SiO2 substrate and HF to under-etch?	
a) It is simplifies and makes faster the lithographic process.	
b) It is possible to obtain higher mobility values.	
c) It allows the use of different metal as electrodes	x
5. Quantum transport in carbon nanotube and nanowire hybrid devices Which of the following group of objects can be found on one specific single poster?	
a) carbon nanotube, InAs wire, graphene flake, Py strip	
b) carbon nanotube, InAs wire, snow flake, Permalloy strip	x
c) carbon nanotube, superconducting contact, ferromagnetic contact, graphene-based spin-valve	
6. Transport through graphene on SrTiO3 What is the main feature of SrTiO3 as a substrate that triggers its interest for studying electron transport in graphene?	
a) The large and temperature dependent dielectric constant.	x
b) The low optical contrast that graphene yields on top of it.	
c) The possibility of having these substrates with an atomically flat crystal surface.	
7. The thermodynamic meaning of negative entropy We find a process by which we can erase information. In the single-shot case the work cost of this process is related to:	
a) The smooth max-entropy	x
b) The smooth min-entropy	
c) The really smooth von Neumann entropy	
8. Multiparticle Entanglement on an Atom Chip How is the inter-state interaction strength controlled in the experiment?	
a) By changing the density overlap between states	x
b) Using a Feshbach resonance	
c) By changing the confinement strength in a state-dependent way	
9. Graphene: the ultimate two-dimensional conductor What is the big advantage that bilayer graphene has over single layer graphene ?	
a) Bilayers are twice as thick therefore they are easier to identify and to prepare	
b) Bilayers are stiffer, and are less affected by wrinkling	
c) Bilayers have a different electronic spectrum, and usually show a band gap.	x
10. Helical modes in carbon nanotubes generated by strong electric fields Can one get helical modes in carbon nanotubes without applying a magnetic field?	
a) Yes, it is possible in an all-electric setup	x
b) No, we always need a time-reversal symmetry breaking external field	
c) Yes, but only at relativistic speeds near a black hole	
11. Quantum many-body physics with ultracold atoms I How do we infer the spatial ordering of the atoms after self-organsation?	
a) momentum-resolved observation of atoms after time of flight	x
b) detecting the ionized atoms on a multi-channel plate	
c) frequency-dependent absorption of the driving field	

12. Quantum many-body physics with ultracold atoms II Why are fluctuations suppressed in an ultracold Fermionic Lithium gas?	
a) compression due to the strongly confining potential	
b) strong interactions between the atoms	
c) the overwhelming Pauli principle	x
13. Quantum memory coupled to cavity modes - It is possible to read-out the quantum memory by coupling the spins of the Kitaev honeycomb model to quantized cavity fields. Which type of coupling is the most appropriate ?	
a) Linear coupling to the spins	x
b) Quadratic coupling to the spins	
c) Jaynes-Cummings type of coupling	
14. Quantum-state control of translationally cold molecular ions in ion traps - What is the order of magnitude of the observed lifetime of rotational quantum states in localized, apolar molecular ions in an ion trap ?	
a) microseconds	
b) seconds	
c) minutes	x
15.What numerics can tell us about ultracold atoms - How are the strong interactions reached in the experimental realization of the Stoner problem describing ferromagnetism?	
a) through an optical lattice suppressing the kinetic energy	
b) by adiabatically ramping up the magnetic field till the ground state is reached	
c) by quenching the magnetic field suppressing the molecule production rate	x
16. Nuclear Spin Relaxation in an All-Electrical Lateral Spin Transport Device Which kind of temperature dependence of the nuclear spin relaxation rate in GaAs has been observed?	
a) quadratic	
b) linear	
c) sublinear	x
17. Inverted GaAs 2D Electron Gas in close proximity to InAs Quantum Dots Self-assembled InAs quantum dots in close proximity to a 2DEG	
a) increase the 2DEG mobility	
b) do not affect the 2DEG mobility	
c) decrease the 2DEG mobility	x
18. The Uncertainty Principle in the Presence of Quantum Memory - What characteristic feature of quantum mechanics must be incorporated when studying uncertainty relations having a quantum memory at hand?	
a) Entanglement	x
b) Quantum Interference	
c) Wave-Particle-Duality	
19. Tensor network states For which systems do tensor network states generally give a good approximation?	
a) Strongly entangled systems.	
b) Weakly interacting systems.	
c) Systems with an area law of the entanglement entropy.	x
20. Nanodevices based on Ga[Al]As heterostructures - How much further can an electron in a high-mobility 2DEG, compared to one in a shallow 2DEG, travel before it's scattered?	
a) 40x	x
b) 900x	
c) 24000x	
21. Transport in graphene quantum dots Why do we put graphene onto boron-nitride?	
a) Visibility of graphene is significantly increased	
b) Carrier mobility is significantly increased	x
c) Smallest possible feature size of the devices is significantly decreased	
22. Localization of Toric Code defects - Our results indicate that small time-independent disorder in the Toric Code coupling constants ...	
a) ... leads to an increase of the success probability of active error correction due to the localization of the anyons.	x
b) ... doesn't affect the success probability of active error correction.	
c) ... leads to a decrease of the success probability of active error correction due to the anyon localization problem.	
23. Quantum control of interacting qubits - How many qubits do you need to have access to if you want to run an arbitrary quantum algorithm on a chain of qubits interacting by a Heisenberg interaction	
a) all of them	
b) the two qubits at the ends of the chain	
c) the first qubit	x

24. A single fermion in a Bose Josephson Junction What kind of interferometer can we implement with the Bose Josephson Junction?	
a) Michelson--Morley	
b) Mach--Zehnder	x
c) Runge--Kutta	
25. Ion trap technologies for investigations of open quantum systems What width are the optimised "separation" electrodes?	
a) 185 um,	
b) 155 um	x
c) 215 um	
26. Observation of photon blockade in quantum dot cavity-QED Why do we use a re-pump laser?	
a) To cure the system from charge blinking.	x
b) To initialize the spin state of the quantum dot.	
c) To empty the cavity from present photons.	
27. A coupled quantum dot laser amplifier: raman transition between singlet and triplet states Which mechanism is the main suspect for the fast relaxation rate from the triplet to the singlet ground state?	
a) Cotunneling	x
b) Hyperfine interaction	
c) Spin-orbit ineraction	
28. Manipulating Rydberg States of Atoms and Molecules - What is the dominant loss mechanism when trapping a Rydberg -Stark state with principal quantum number n=30 at room temperature?	
a) blackbody radiation induced transitions to untrappable states	
b) blackbody ionization	x
c) trap loss caused by interactions between neighbouring Rydberg atoms	
29. Multistage Zeeman Deceleration of Paramagnetic Atoms - What limits the maximum achievable phase-space density of the decelerated particles in a multistage Zeeman decelerator?	
a) the initial phase-space density of the particles	x
b) the number of deceleration solenoids	
c) the magnetic-moment-to-mass ratio of the particles	
30. Using High Frequencies to Probe Semiconductor Nanostructures Which of these is NOT an advantage of measuring at high frequencies:	
a) Better impedance matching at higher frequencies	x
b) Larger bandwidth of high frequency amplifiers	
c) Less 1/f noise	
31. Experimental State Tomography of Itinerant Single Microwave Photons Which of the given states is not a single photon state?	
a) Coherent state |\alpha> with \alpha = 1	x
b) Fock state |1>	
c) Superposition state a|1> + b|0>	
a)	
b)	
c)	
a)	
b)	
c)	
a)	
b)	
c)	
a)	
b)	
c)	
a)	
b)	
c)	