

# Zkušenosti z účasti na mezinárodních konferencích **CVQIP'12 a CEWQO'12**

Radim Filip

Katedra optiky, Univerzita Palackého,  
17. listopadu 12, 77146 Olomouc



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

# KONFERENCE

## **CV QIP'12**

Název konference: Continuous Variable Quantum Information Processing 2012

Datum konání: 27.4. - 30. 4. 2012

Místo: Lyngby, Dánsko

Počet účastníků: 57

Počet přednášek: 23

Počet posterů: cca 20

## **CEWQO'12**

Název konference: Central European Workshop on Quantum Optics 2012

Datum konání: 2.7. - 6. 7. 2012

Místo: Sinaia, Rumunsko

Počet účastníků: 209

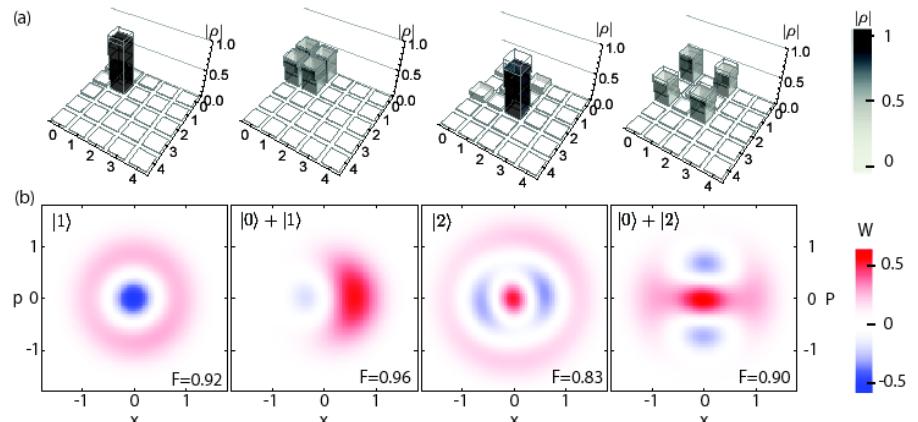
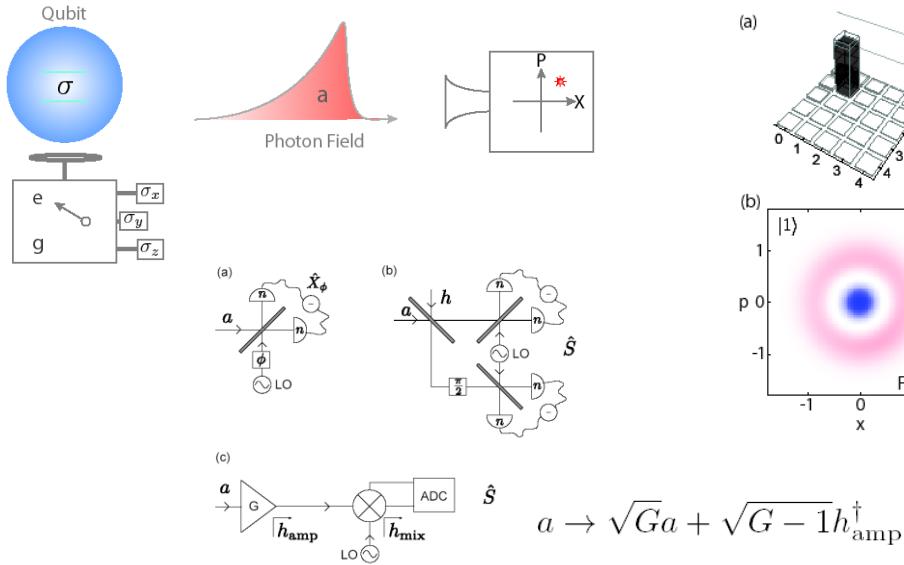
Zvané přednášky: 74

Ostatní přednášky: 54

Počet posterů: 80

# Zajímavé příspěvky na konferenci CV QIP'12

*Andreas Wallraff: Exploring Quantum Properties of Propagating Microwaves with Superconducting Circuits*



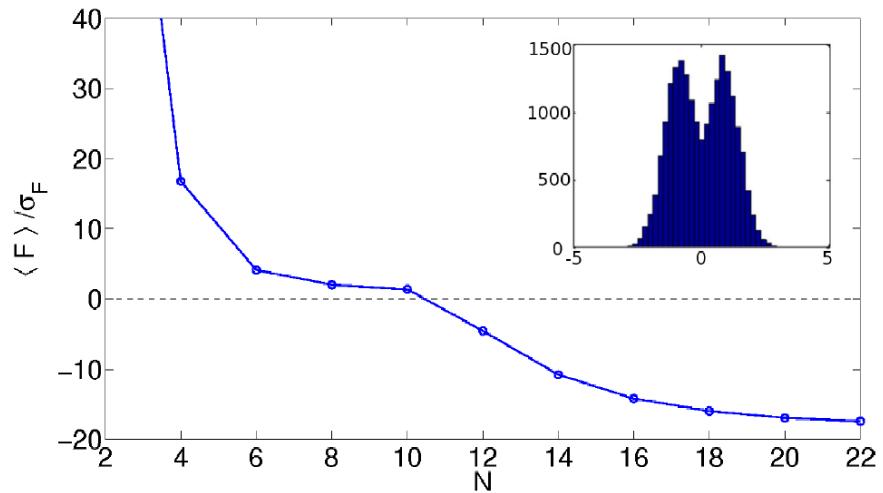
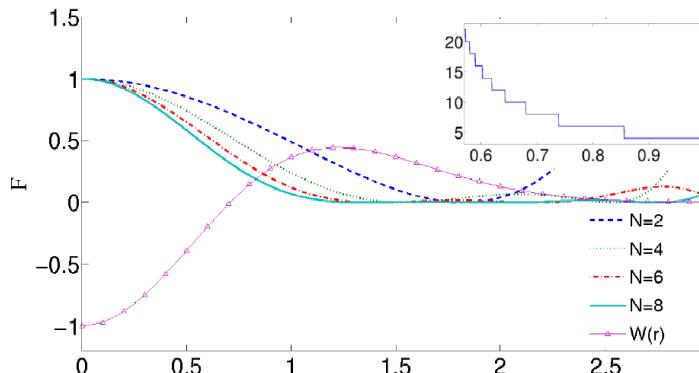
- noisy detector calibration and characterization
  - joint state tomography methods of a radiation field mode and a two-measured photon statistics and generalized quasi-probability distributions
- C. Eichler, D. Bozyigit, A. Wallraff, Phys. Rev. A 86, 032106 (2012)

# Zajímavé příspěvky na konferenci CV QIP'12

*Anders S. Sørensen: Breakdown of the classical description of a local system*

$$\langle \mathfrak{F} \rangle = \int dx dp W(x, p) \mathfrak{F}(x, p) \geq 0.$$

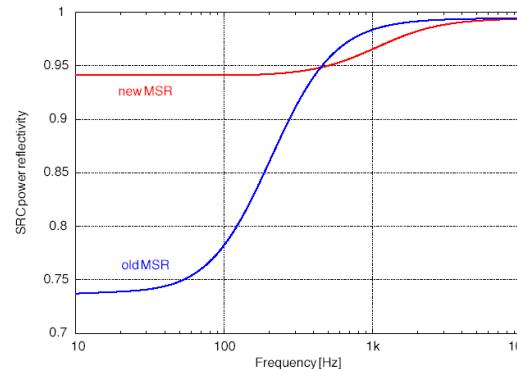
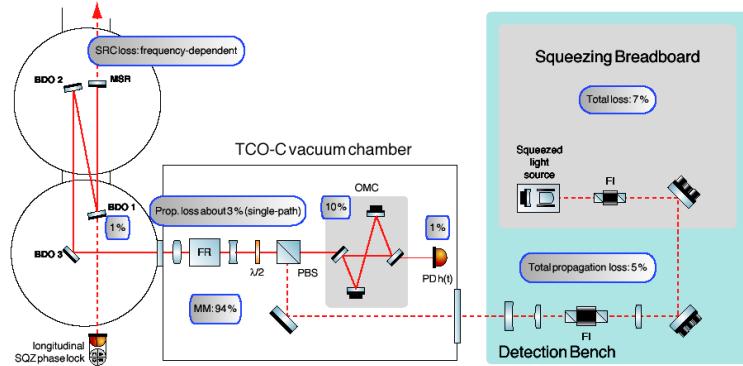
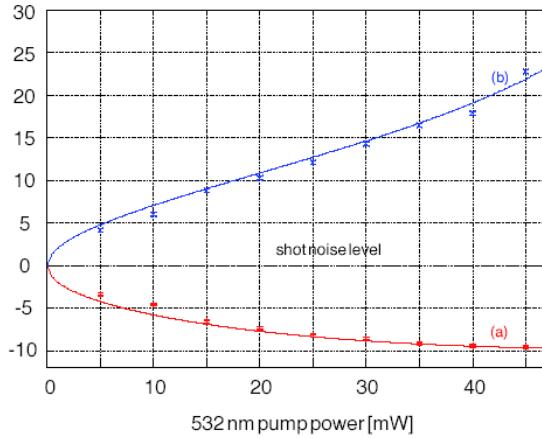
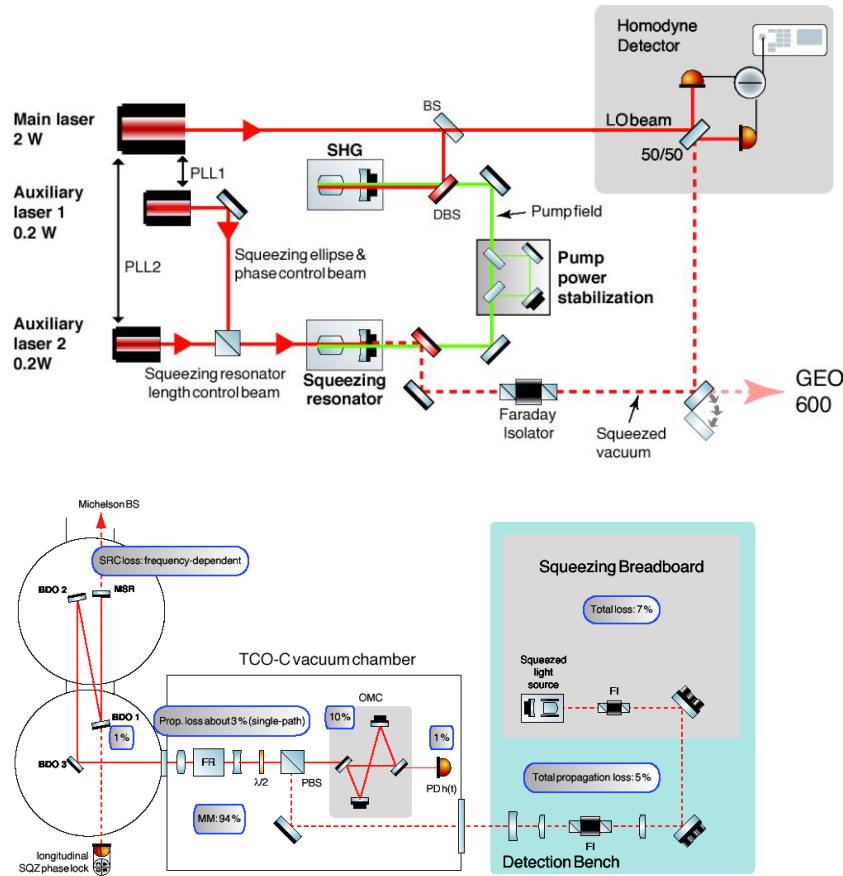
$$\langle \mathfrak{F} \rangle = \langle M^2 \rangle = \left\langle \left( 1 + \sum_{n=1}^{N/2} C_{2n} r^{2n} \right)^2 \right\rangle$$



- demonstration of a fundamental difference between classical and quantum mechanics for a single local system.
- a simple criterion that must be fulfilled for any joint probability distribution in classical physics.
- Eran Kot, Niels Grønbech-Jensen, Bo M. Nielsen, Jonas S. Neergaard-Nielsen, Eugene S. Polzik, Anders S. Sørensen, arXiv:1110.3060

# Zajímavé příspěvky na konferenci CV QIP'12

## Roman Schnabel: A gravitational wave observatory operating beyond the quantum shot-noise limit

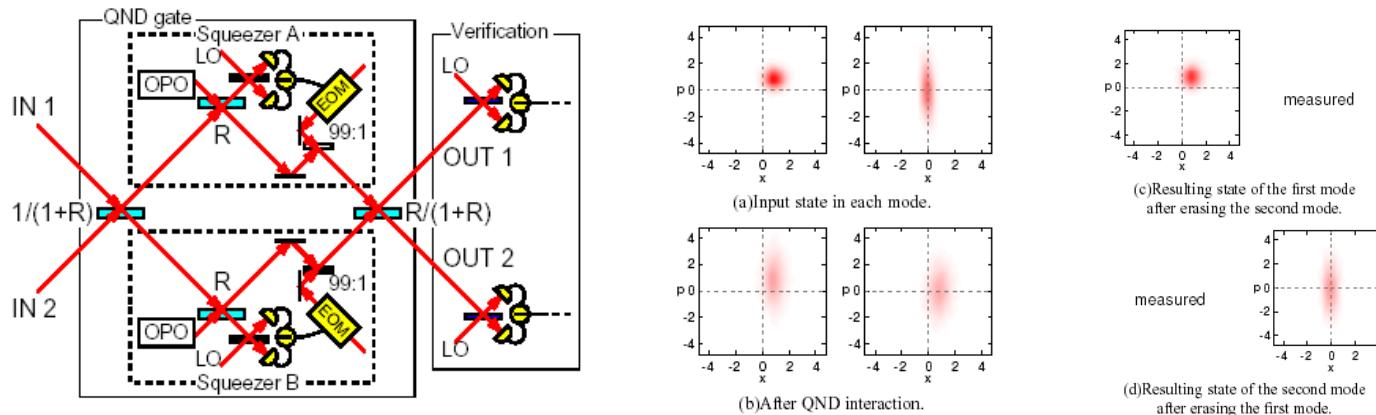


- Quantum squeezing at low frequencies is applied! Result is progress ...
- Alexander Khalaidovski, Henning Vahlbruch, Nico Lastzka, Christian Graef, Harald Lueck, Karsten Danzmann, Hartmut Grote, Roman Schnabel, arXiv:1112.0198

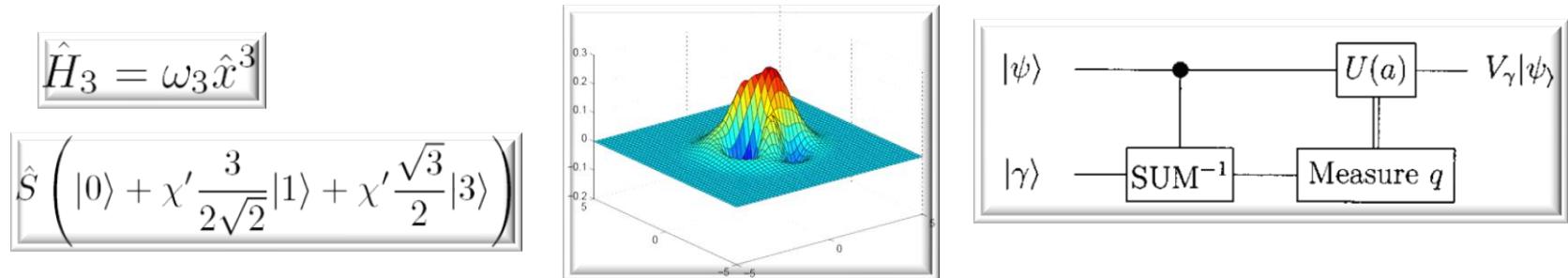
# Vlastní příspěvěk na konferenci CV QIP'12

Radim Filip: *Measurement-induced unconditional quantum nonlinearity*

Reversible quadratic nonlinearity with squeezed resource state:



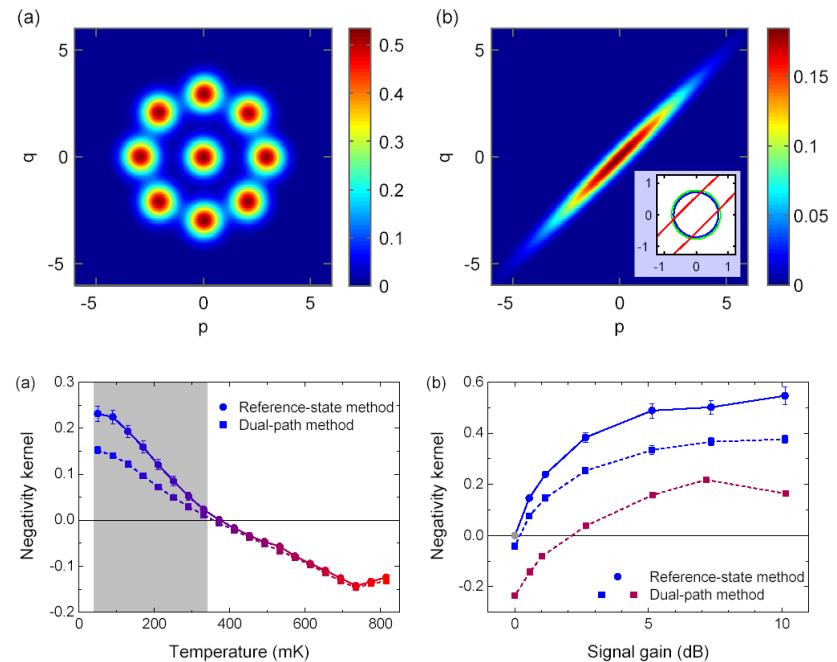
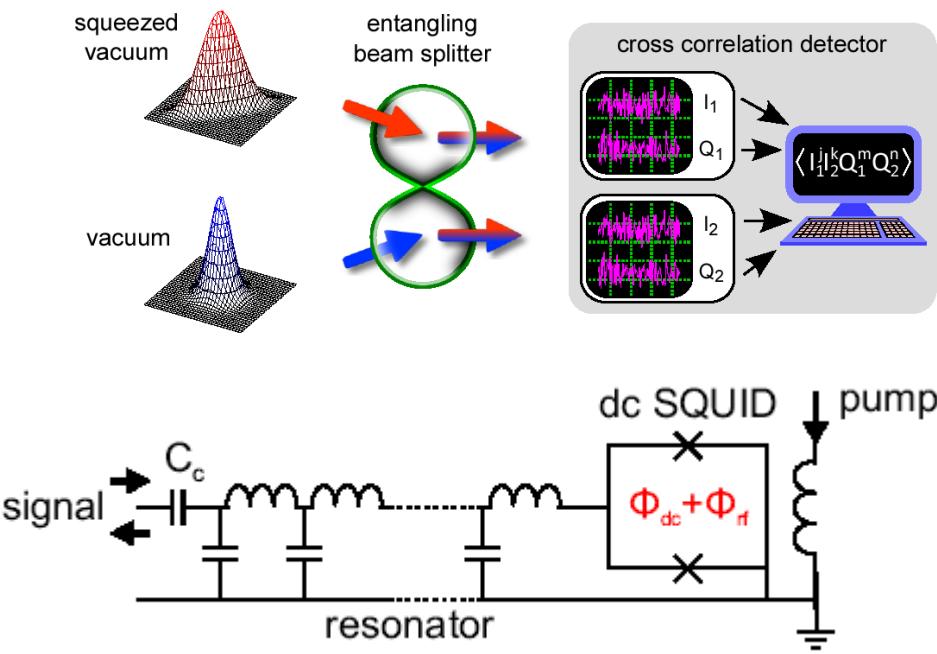
Reversible weak cubic nonlinearity with weak-cubic squeezed resource state:



Y. Miwa, J. Yoshikawa, R. Ukai, R. Filip, A. Furusawa, arXiv:1007.0314, P. Marek, R. Filip, and A. Furusawa, Phys. Rev. A 84, 053802 (2011).

# Zajímavé příspěvky na konferenci CEWQO 2012

## R. Gross: Quantum optics with superconducting circuits

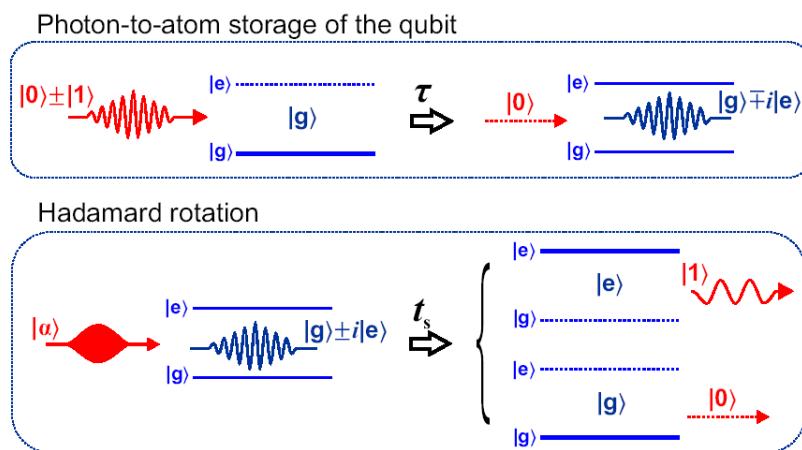


- frequency-degenerate entanglement between continuous-variable quantum microwaves propagating along two spatially separated paths.
- quantum analog of optical experiment.

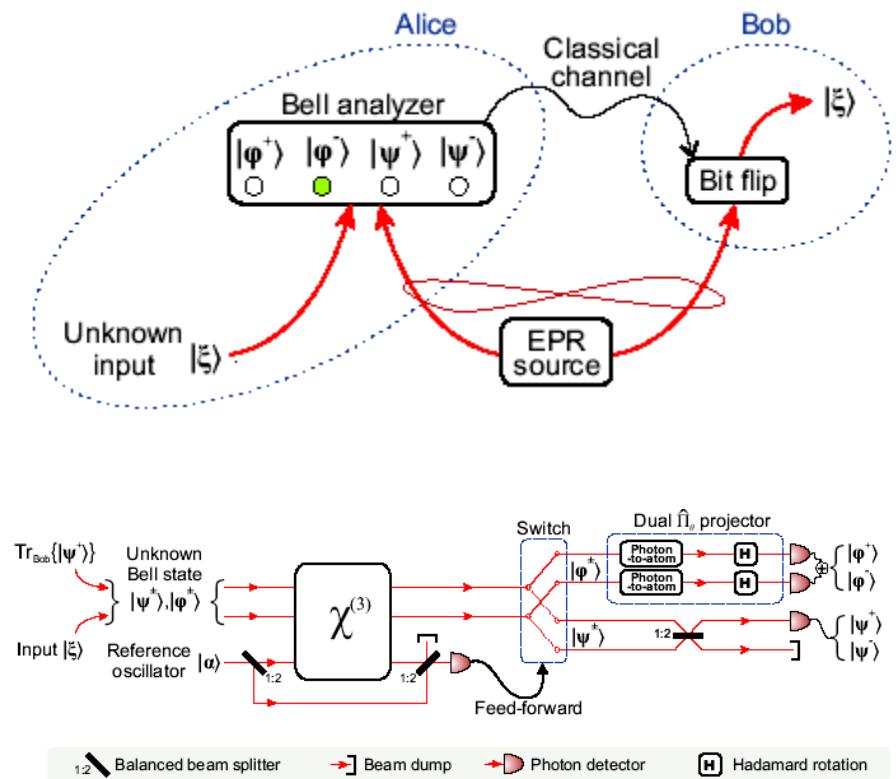
T. Niemczyk, F. Deppe, H. Huebl, E. P. Menzel, F. Hocke, M. J. Schwarz, J. J. Garcia-Ripoll, D. Zueco, T. Hümmer, E. Solano, A. Marx, R. Gross, Nature Physics 6, 772 - 776 (2010)

# Zajímavé příspěvky na konferenci CEWQO 2012

## G. Björk: Mode entanglement in single-excitation state



Bell state	Local operation
$ \varphi^+\rangle$	$a 1\rangle + b 0\rangle \rightarrow$ transfer, flip $\rightarrow  \xi\rangle$
$ \varphi^-\rangle$	$a 1\rangle - b 0\rangle \rightarrow$ shift, transfer, flip $\rightarrow  \xi\rangle$
$ \psi^+\rangle$	$a 0\rangle + b 1\rangle =  \xi\rangle$
$ \psi^-\rangle$	$a 0\rangle - b 1\rangle \rightarrow$ shift $\rightarrow  \xi\rangle$



- proof that teleportation with a single particle is in principle just as reliable as with two particles.
- dispel the skepticism surrounding single-photon entanglement.
- deterministic Bell state analyzer is proposed which uses only classical resources, namely coherent states, a Kerr non-linearity, and a two-level atom.

# Zajímavé příspěvky na konferenci CEWQO 2012

J.A Bergou: *Extracting partial information for a qubit: state discrimination by multiple users*

$$P_s = \text{tr}(\eta_1 \rho_1 \Pi_1) + \text{tr}(\eta_2 \rho_2 \Pi_2),$$

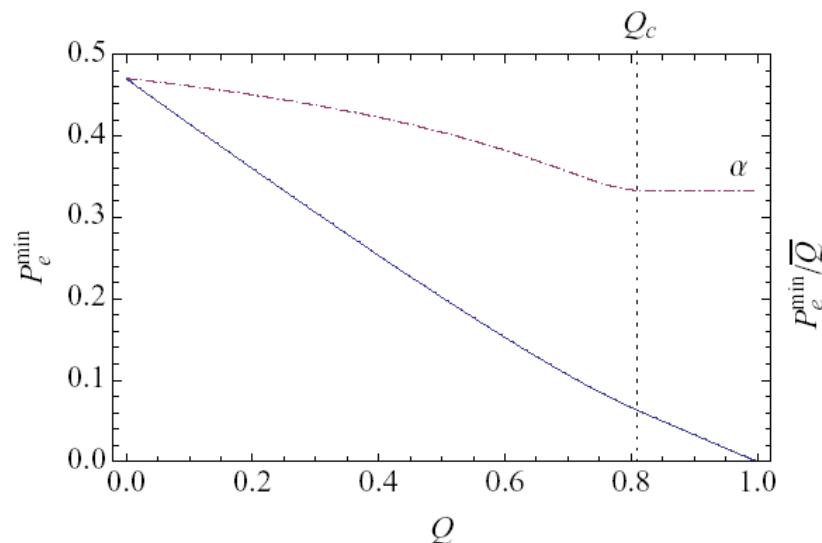
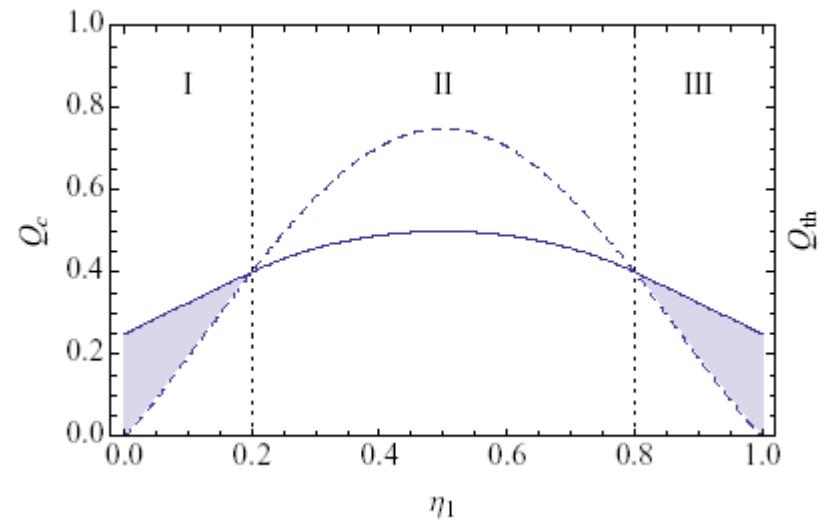
$$P_e = \text{tr}(\eta_1 \rho_1 \Pi_2) + \text{tr}(\eta_2 \rho_2 \Pi_1),$$

$$Q = \text{tr}(\rho \Pi_0),$$

$$\tilde{\Pi}_i = \Omega^{-1/2} \Pi_i \Omega^{-1/2} \geq 0.$$

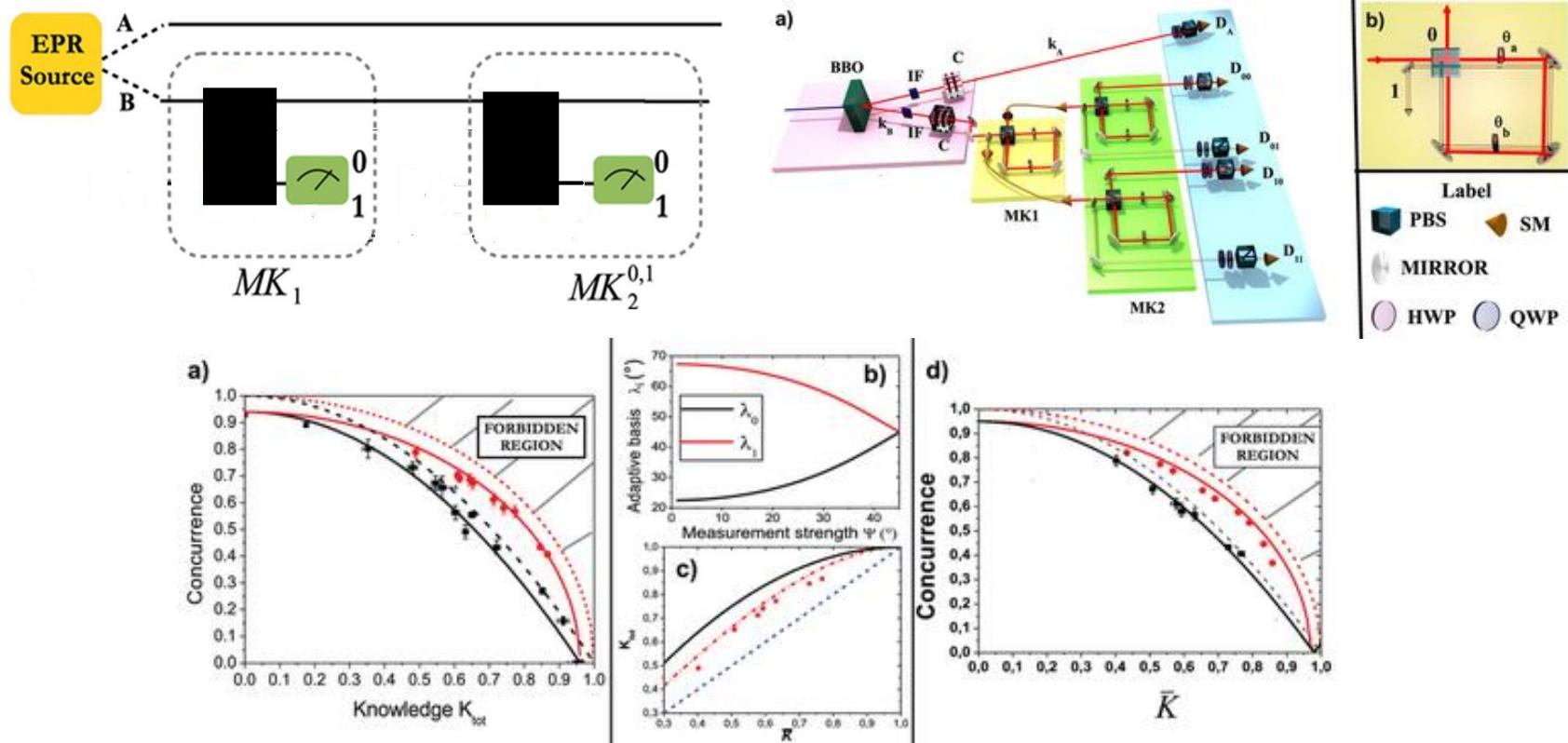
- the solution to the problem of optimally discriminating among quantum states, i.e., identifying the states with maximum probability of success when a certain fixed rate of inconclusive answers is allowed.

E. Bagan, R. Munoz-Tapia, G. A.Olivares-Renteria, J. A. Bergou, arXiv:1206.4145



# Vlastní příspěvěk na konferenci CEWQO 2012

R. Filip et al., *How knowledge is limited and accumulated in quantum mechanics, invited talk*



- Knowledge is accumulated differently in quantum mechanics.
- Quantum feedforward is necessary.