

# Papers Published in Technical Journals and Conferences

## Sub-THz RTD Oscillators Integrated with Planar Horn Antennas for Horizontal Radiation

K. Urayama, S. Suzuki, M. Asada, H. Sugiyama, and H. Yokoyama  
Proc. of IRMMW-THz 2008, p. T5D42, Pasadena, CA, USA, 2008.

Fabrication and oscillation characteristics of sub-THz resonant tunneling diode (RTD) oscillators integrated with planar horn antennas for horizontal radiation are reported. The device consists of a GaInAs/AlAs RTD, a resonator, a waveguide, and a horn antenna on a semi-insulating InP substrate. Oscillation frequency of 455 GHz and horizontal output power of  $\sim 0.6 \mu\text{W}$  were observed. The output power is small at present because of small values of the peak-to-valley current ratio and the voltage width of the negative differential resistance region of the RTD.

## Present Status and Prospects of H-terminated Diamond RF Power FETs

M. Kasu, K. Ueda, and K. Michal

NEW DIAMOND, Ohmsha, Vol. 25, No. 1, pp. 3–7, 2009.

Recent achievements of diamond radio-frequency power devices toward information technology systems are reviewed.

## Frequency Switching with Bias Polarity in Resonant Tunneling Diodes Oscillating at Around 600 GHz

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Proc. of OTST 2009, OSA, Vol. OTST2009, p. SuE1, Santa Barbara, USA.

We report resonant tunneling diode (RTD) oscillators which have two frequencies switched with bias polarity at around 600 GHz.

## Cloning of qubits with both the cloned state and the state orthogonal to it as inputs

G. Kato

Phys. Rev. A, APS, Vol. 79, No. 3, pp. 032315-1–7, 2009.

A universal cloning machine is derived. The machine produces  $c$  clones of an unknown qubit from  $s$  identical replicas of the qubit and  $k$  identical replicas of its orthogonal qubit. For the standard cloning machine, i.e.,  $k=0$ , the universal-not machine,  $s=0$ , and some other cases, the optimum machine is well known. The universal cloning machine derived in this paper gives clones whose fidelity is the same

value as that for the optimum machine. In the case of sufficiently large  $c$ , we show that the clone fidelity generated by the cloning machine from  $s \neq 0$  replicas and  $k \neq 0$  orthogonal replicas is higher than that generated by the optimal cloning machine from  $s+k$  replicas in the case of  $s+k \leq 300$ .

## Synthesis and properties of superconducting $T'-R_2\text{CuO}_4$ ( $R=\text{Pr, Nd, Sm, Eu, Gd}$ )

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Phys. Rev. B, APS, Vol. 79, No. 10, pp. 100508-1–4, 2009.

The parent compounds of high- $T_c$  cuprates have long been considered to be antiferromagnetic insulators. In this Rapid Communication, however, we report that superconductivity is achieved in  $T'-R_2\text{CuO}_4$  ( $R=\text{Pr, Nd, Sm, Eu, Gd}$ ). Superconducting  $T'-R_2\text{CuO}_4$  films were synthesized by using metal-organic decomposition. The highest  $T_c$  of  $T'-R_2\text{CuO}_4$  is over 30 K, substantially higher than “electron-doped” analogs. Remarkably,  $\text{Gd}_2\text{CuO}_4$ , even the derivatives of which have not shown superconductivity so far, becomes superconducting with  $T_c^{\text{onset}}$  as high as  $\sim 20$  K. The implication of our results is briefly discussed.

## Possibility of Head-Shape Simplification for an Acoustical Telepresence Robot: TeleHead

I. Toshima and S. Aoki

Journal of Robotics and Mechatronics, Vol. 21, No. 2, pp. 223–228, 2009.

We built an acoustical telepresence robot called TeleHead. TeleHead has a user-like dummy head and is synchronized with the user's head movement in real time. The user-like dummy head improves sound localization accuracy. However, making a user-like dummy head for each user is not realistic from the viewpoint of engineering. Therefore, we made several kinds of simplified dummy head and examined their influence on sound localization. The results show that, among the dummy heads tested, the user-like dummy head is the best one for sound localization experiments. When subjects used a simple rugby-ball-like dummy head, they could not localize sound at all. The results suggest that an accurate dummy head improves sound localization accuracy and point to the possibility of simplifying dummy heads for practical use in sound localization.