**National Institute of Physics**

Authors SALOMA, C

Title COMPUTATIONAL-COMPLEXITY AND THE OBSERVATION OF PHYSICAL SIGNALS

Journal JOURNAL OF APPLIED PHYSICS

Volume 74

Issue 9

Beginning page 5314

End page 5319

DOI 10.1063/1.354232

Published Date NOV 1 1993

Abstract The effects of computational complexity on the characteristics of a physical signal that is reconstructed from its representation of sampled data are analyzed. It is found that a more complex algorithm does not only require longer time to implement, but also yields an erroneous reconstruction. The reconstruction suffers from contrast degradation, phase shifts, and attenuation of details relative to the true signal. These unwanted effects are caused by the existence of spurious frequencies in the computed spectrum due to rounding-off errors. The amplitude distribution of the spurious frequencies across the spectral bandwidth strongly depends on the number of data points handled and on the complexity of the particular reconstruction algorithm employed. Since the floating point representation of numbers in a computer is always finite, an upper limit exists in the maximum number of additions or multiplications required to compute a quantity reliably without errors.

Authors BERNIDO, CC

Title PATH-INTEGRAL TREATMENT OF THE GRAVITATIONAL ANYON IN A UNIFORM MAGNETIC-FIELD

Journal JOURNAL OF PHYSICS A-MATHEMATICAL AND GENERAL

Volume 26

Issue 20

Beginning page 5461

End page 5471

DOI 10.1088/0305-4470/26/20/029

Published Date OCT 21 1993

Abstract The Green function for a relativistic particle interacting with a gravitational point source and a flux confined at the origin of the (p, phi)-space is evaluated using Feynman's summation-over-histories. The bound state energy spectrum is calculated when a uniform magnetic field is applied perpendicular to the (p, phi)-space.
Authors SALOMA, C
XU, XM

Title THE DIELECTRIC MICROSPHERE IN A SINGLE PLANE POLARIZED GAUSSIAN-BEAM - CHARACTERISTICS OF THE RADIATION FORCE

Journal OPTIK
Volume 94
Issue 4
Beginning page 173
End page 176
Published Date OCT 1993
PY 1993

Abstract We study the characteristics of the radiation force acting on a dielectric microsphere near the focus of a plane polarized TEM00 Gaussian beam. These characteristics include the magnitude and direction of the force as a function of refractive index relative to the surrounding medium, the dependence of the force magnitude on the wavelength, axial distance and sphere radius corresponding to the two independent states of plane polarization.

Authors SALOMA, C
DARIA, V
MUNOZ, J

Title FOURIER-TRANSFORM REFRACTOMETRY USING MULTICHANNEL DETECTION

Journal APPLIED OPTICS
Volume 32
Issue 25
Beginning page 4785
End page 4789
Published Date Sep 1 1993

Abstract A versatile refractometer that utilizes multichannel interferometry is developed. The refractive index of a homogeneous sample placed in one arm of the triangular common-path interferometer is computed from the induced shift in the position of the He-Ne probe wavelength. The interferogram is detected by a 2048-element CCD line sensor and Fourier transformed by using a dedicated 32-bit microprocessor. The resolution and accuracy of refractive-index measurements depend on the angle of incidence that the sample makes with the optical axis of the interferometer.
Authors SALOMA, C
DARIA, VR

Title PERFORMANCE OF A ZERO-CROSSING OPTICAL-SPECTRUM ANALYZER

Journal OPTICS LETTERS

Volume 18
Issue 17
Beginning page 1468
End page 1470
DOI 10.1364/OL.18.001468
Published Date Sep 1 1993

Abstract The performance of a zero-crossing-based optical spectrum analyzer is presented. With the use of only a single comparator, the analyzer circuit detects one zero crossing per Nyquist interval with a location accuracy of 1 part in 256. The dynamic range of sampling is limited only by the supply voltages of the comparator and the noise arising from truncation errors associated with computation. The 512-component spectra of various interferogram inputs are directly computed by Newton's formula from the measured crossings. The single-channel spectrum analyzer with a preselectable Nyquist sampling interval setting is constructed with discrete transistor-transistor logic and analog components. The ultimate performance characteristics of the analyzer are set by the response capabilities of the electronic components used.

Authors SALOMA, C
HAEBERLI, P

Title 2-DIMENSIONAL IMAGE-RECONSTRUCTION FROM FOURIER COEFFICIENTS COMPUTED DIRECTLY FROM ZERO CROSSINGS

Journal APPLIED OPTICS

Volume 32
Issue 17
Beginning page 3092
End page 3093
Published Date JUN 10 1993

Abstract Two-dimensional image reconstruction using Fourier coefficients that are computed directly from the sampled representation of zero crossings is demonstrated. A two-dimensional image of dimensions N(x) x N(y) is interpreted as a set of N(y) independent x-space lines (in gray-scale format) that are arranged uniquely along they direction. Each line has N(x) elements. Reconstruction is achieved first by computing the entire set of N(y) one-dimensional Fourier transforms from the measured zero crossings using Newton's formula. Each N(y)th line spectra has N(x) Fourier coefficients. The inverse Fourier transform is then applied to each of the line spectra to obtain a set of N(y) reconstructed x-space lines. The reconstructed image is obtained by arranging the reconstructed lines properly along they direction.
Authors SALOMA, C HAEBERLI, P
Title OPTICAL-SPECTRUM ANALYSIS FROM ZERO CROSSINGS
Journal OPTICS LETTERS
Volume 16
Issue 19
Beginning page 1535
End page 1537
DOI 10.1364/OL.16.001535
Published Date OCT 1 1991
Abstract A practical method of computing the spectral components directly from measured zero crossings of interferograms is presented. The method requires the sampling of only one zero crossing per Nyquist interval and yields results with a normalized mean-square error that is better than 10(-6) with respect to the fast Fourier transformation when the zero crossing is located within the Nyquist interval with an accuracy of one part in 10(6). The method is also robust against error frequencies that may arise owing to the finite range in the floating-point representation of numbers in a computer. The error frequencies appear whenever a large number of crossings is processed. This type of error is not related to the accuracy of locating the zero crossings and limits the operational bandwidth of a zero-crossing-based optical spectrum analyzer.

Authors BASCO, F BERNIDO, CC CARPIOBERNIDO, MV
Title ON THE HAMILTONIAN PATH INTEGRAL IN POLAR COORDINATES FOR NONCENTRAL POTENTIALS
Journal PHYSICS LETTERS A
Volume 157
Issue 8-9
Beginning page 461
End page 464
DOI 10.1016/0375-9601(91)91019-A
Published Date Authors G 12 1991
Abstract A new derivation of the Hamiltonian path integral in polar coordinates is presented. This differs from earlier results in that the procedure is applicable to central and noncentral potentials.

Authors CARPIOBERNIDO, MV
Title GREEN-FUNCTION FOR AN AXIALLY SYMMETRICAL POTENTIAL-FIELD - A PATH INTEGRAL EVALUATION IN POLAR COORDINATES
Journal JOURNAL OF PHYSICS A-MATHEMATICAL AND GENERAL
Volume 24
Issue 13
Beginning page 3013
End page 3019
DOI 10.1088/0305-4470/24/13/016
Published Date JUL 7 1991
Abstract An explicit evaluation of the path integral in spherical polar coordinates for the Green function of a particle moving in an axially symmetric potential field is presented. A closed form of the Green function is obtained from which the energy eigenvalues and the normalized eigenfunctions are obtained as the poles and the residues at the poles, respectively.
**Highlighted**

**Authors** CARPIOBERNIDO, MV  
**Title** PATH INTEGRAL QUANTIZATION OF CERTAIN NONCENTRAL SYSTEMS WITH DYNAMIC SYMMETRIES  
**Journal** JOURNAL OF MATHEMATICAL PHYSICS  
**Volume** 32  
**Issue** 7  
**Beginning page** 1799  
**End page** 1807  
**DOI** 10.1063/1.529244  
**Published Date** JUL 1991  
**Abstract** Path integral quantization is done for the five classes of potentials appearing in the systematic search for nonrelativistic systems with dynamical symmetries done by Makarov, Smorodinsky, Valiev, and Winternitz [Nuovo Cimento A 52, 1061 (1967)]. By an iterated application of Bateman's series formula to the polar coordinate path integral, an expansion is obtained on the Feynman kernel or the Green's function, whichever is possible, in terms of hypergeometric functions of the polar and azimuthal parts and a radial path integral is obtained whose evaluation yields the energy eigenvalues and the normalized wave functions. Special cases include the Hartmann potential and the ring-shaped oscillator.

**Authors** SALOMA, C  
DE VERA, AJ  
**Title** PHOTOACOUSTIC DEPTH PROFILING BY CROSS-CORRELATION USING A GAAS LIGHT-EMITTING DOIODE  
**Journal** APPLIED OPTICS  
**Volume** 30  
**Issue** 17  
**Beginning page** 2393  
**End page** 2397  
**Published Date** JUN 10 1991  
**Abstract** We present a new approach to depth profiling optically opaque multilayered samples. The presence of interfaces in a sample is revealed by cross-correlating a randomly generated optical probe beam from a GaAs light emitting diode and its generated photoacoustic signal. The technique attains a throughput advantage over previous profiling methods since it operates without an external optical modulator. Random intensity modulation of the light source is achieved by direct current modulation of the diode. We show the effectiveness of technique by establishing the double-layer structure of a magnetic tape.
Authors BERNIDO, CC
           CARPIO-BERNIDO, MV
Title  PATH INTEGRAL QUANTIZATION OF NONRELATIVISTIC SYSTEMS WITH
       MAGNETIC-CHARGES
Journal JOURNAL OF PHYSICS A-MATHEMATICAL AND GENERAL
Volume 24
Issue 2
Beginning page 407
End page 413
DOI 10.1088/0305-4470/24/2/014
Published Date JAN 21 1991
Abstract The exact path integration for systems with magnetic charges is presented. The Green function and bound-state energy spectrum of a dyonium are obtained. Unlike earlier works, the exact path integration is done directly in spherical polar coordinates and does not require the use of coordinate transformations such as the non-bijective transformation of Kustaanheimo and Stiefel.

Authors ALVERO, LM
           MAGPANTAY, JA
Title  COMPACT SOLUTION TO THE GENERALIZED MASTER EQUATION
Journal PHYSICAL REVIEW A
Volume 41
Issue 6
Beginning page 3369
End page 3371
DOI 10.1103/PhysRevA.41.3369
Published Date MAR 15 1990

Authors MURIEL, A
Title  THE PERIODICALLY KICKED 2-LEVEL ATOM
Journal PHYSICS LETTERS A
Volume 128
Issue 6-7
Beginning page 367
End page 368
DOI 10.1016/0375-9601(88)90192-2
Published Date APR 11 1988

Authors MAGPANTAY, JA
           YANGA, DM
Title  STOCHASTIC QUANTIZATION AND THE TUNNELING PROBLEM
Journal PHYSICAL REVIEW D
Volume 34
Issue 2
Beginning page 557
End page 564
DOI 10.1103/PhysRevD.34.557
Published Date JUL 15 1986
Authors MAGPANTAY, JA
ROMERO, DB
Title GAUGE-INVARIANT POTENTIALS FROM YANG-MILLS THEORY
Journal ANNALS OF PHYSICS
Volume 161
Issue 2
Beginning page 303
End page 313
DOI 10.1016/0003-4916(85)90082-X
Published Date 1985

Authors MAGPANTAY, JA
YANGA, DM
Title DERIVATION OF THE LEE-YANG TERM VIA STOCHASTIC QUANTIZATION
Journal PHYSICAL REVIEW D
Volume 32
Issue 2
Beginning page 516
End page 518
DOI 10.1103/PhysRevD.32.516
Published Date 1985

Natural Science Research Institute
Authors GO, NE
PEREZOROZCO, GD
HALOS, SC
Title INVITRO RESPONSE OF EMBRYOS FROM DIFFERENT PROVENANCES OF PINUS-CARIBAEA VAR HONDURENSIS MORELET
Journal PLANT CELL TISSUE AND ORGAN CULTURE
Volume 32
Issue 1
Beginning page 1
End page 7
DOI 10.1007/BF00040109
Published Date JAN 1993
Abstract The tissue culture response of embryo explants of four fast- and slow-growing provenances of Pinus caribaea var. hondurensis was investigated. Treatments included adventitious bud induction and development with benzyladenine (BA) at different concentrations and exposure periods, root induction with naphthaleneacetic acid (NAA) and indolebutyric acid (IBA) and callus production with combinations of NAA, 2, 4-dichlorophenoxyacetic acid (2, 4-D), BA and kinetin. Fast-growing provenances produced nodules earlier on the cotyledonary surface, developed shoots earlier from induced buds and produced more shoots per surviving embryo at lower BA concentrations tested compared with slow-growing provenances. On the other hand, calluses of the slow-growing provenance, La Mosquitia, grew faster on media supplemented with cytokinins and auxins compared with those grown on media supplemented with auxin only. This reaction was not observed with fast-growing provenances. It is suggested that cytokinins in fast-growing provenances promoted organized development more efficiently than in slow-growing provenances.

Authors HALOS, SC
GO, NE
Title MICROPROPAGATION OF PINUS-CARIBAEA MORELET
Journal PLANT CELL TISSUE AND ORGAN CULTURE
Volume 32
Issue 1
Beginning page 47
End page 53
DOI 10.1007/BF00040115
Published Date JAN 1993

Abstract Adventitious shoot formation was induced in excised mature embryos of Pinus caribaea using a modified Murashige and Skoog medium (MSM) supplemented with 6-benzyladenine. The highest frequency (96%) of adventitious bud production was observed when embryos were exposed to 8.9 \textmu M BA for one week prior to transfer to a growth regulator-free medium. Increased BA concentration and longer exposure to BA significantly reduced survival rates of explants. Dilution of the basal medium to 1/4X and 1/8X decreased shoot formation but 1/2X was just as effective as full-strength. Addition of auxins, glyphosate and coconut water to the rooting medium did not improve rooting success beyond that of spontaneous rooting. Sucrose at 1.5% significantly increased rooting of shoots. Plantlets were successfully transferred to the soil after preincubation in liquid medium.

Authors PHAM, LJ
HALOS, SC
Title INTERGENERIC PROTOPLAST FUSION OF TRICHODERMA-REESEI RUT-C-30 AND PENICILLIUM-FUNCULOSUM THOM MG-171 FOR IMPROVED CELLULASE PRODUCTION
Journal ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Volume 613
Beginning page 575
End page 581
Published Date DEC 28 1990