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PROGRESS REPORT ON THE DEVELOPMENT OF A LASER/MASER VOCABULARY.

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The development of a laser/maser vocabulary follows the pattern established earlier in two similar projects--(1) Development of a Multi-Coordinate Vocabulary--Chemical Physics, and (2) Development of a Multi-Coordinate Index--Plasma Physics. A set of lists of terms judged to be important to a user of information was developed by a specialist in the field. The lists comprise Appendi A of the report and represents the initial draft. The categories for the sets of lists are (1) properties, and (2) properties or state of matter systems, (3) mathematical entities, (4) objects, (5) methods, and (6) devices. (DH)

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Rita G. Lerner

The vocabulary for the field of lasers and masers which appears in this report was compiled as a logical extension of the development of the type of multi-coordinate vocabulary described in earlier reports (ID 68-3 Development of a Multi-coordinate Vocabulary: Chemical Physics and ID 68-4 Development of a Multi-coordinate Index: Plasma Physics). Lasers and masers are an area in which the interests of the American Institute of Physics overlap with those of the Institute of Electrical and Electronic Engineers. In fact, the overlap is so great that Applied Optics, which is an Optical Society of America journal published by AIP, has recently put out a joint issue with the Proceedings of the IEEE: Quantum Electronics.

Laser and maser literature is also an area of interest to patent offices. ICIREPAT (International Cooperation in Information Retrieval Among Examining Patent Offices) has requested one of its member organizations (the United Kingdom Patent Office) to prepare a vocabulary for laser and masers which would be suitable for patents as well as journal articles. AIP and IEEE therefore agreed to work jointly on the development of a vocabulary in the field of lasers and masers and to maintain liaison with the United States Patent Office, which had expressed an interest in this area.

The thesaurus was prepared by Dr. Bertram Pariser. Like the chemical physics and plasma physics discussed earlier, it consists of a set of lists; one or more terms is to be chosen from each list to describe a paper or patent. The lists consist of the following:

1. Properties
2. Properties or State of Matter Systems
3. Mathematical Entities
4. Objects
5. Methods
6. Devices

All terms included in the lists were judged to be important to the user of the material, and were chosen by Dr. Pariser from Applied Optics, Proceedings of the IEEE: Quantum Electronics, and selected symposium and conference proceedings.

The vocabulary lists, which appear as Appendix A of this report, constitute an initial draft only; they will be submitted to a committee of subject experts who are members of AIP societies or the IEEE for comments and suggestions.

APPENDIX A

LASER/MASER VOCABULARY

prepared by Dr. Bertram Pariser,
Columbia University and MITCU Corp.

APPENDIX A

LASER MASER DICTIONARY BERTRAM PARISER

ATOMIC, MOLECULAR AND ELECTRON PHYSICS

METHODS

Atomic, Molecular and Electron Physics

Atomic Beam
Atomic Bombardment
Atomic Excitation
Beam
Bombardment
Electron Bombardment
Electron Cyclotron Resonance Pumping
Molecular Bombardment
Molecular Beam
Synchronous Motion of Electrons

Cavities

Anti Reflection Coating
Coupling Diffraction - Coupling
Coupling Hole - Coupling
Multicavity
Q Switching
Reflection Coating
Widely Tuned

Communications

Audio Signal
Carrier Wave
Cross Modulation
Demodulation
Heterodyne
Internal Modulation
Mixing
Modulation
Modulation Frequency
Multiplexed
PCM Pulse Code Modulation
Radio Frequency
Reception
Signal Frequency
Video Signal

Environmental Conditions

Bias
D. C. Excitation
Electrical Field
High Voltage
Magnetic Field
Quadrupolar Cylindrical Electrostatic Field
R. F. Excitation

Interaction of Light with Matter

Birefringent Switching
Broad Band Optical Pumping
Molecular Beam Spectroscopy
Narrow Band Optical Pumping
Optical Pumping
Photon Echo
Population Inversion
Pulsed Optical Pumping
Spectroscopy

Laboratory Techniques

Gating
Phase - Locking
Signal to Noise Ratio
Superheterodyne
Transients
X - Ray Microscopy

METHODS (CONT'D)

Laser Applications

- Biomedical Applications of Lasers
- Biomedical Applications of Lasers - Controlled Vessel Anastomisis
- Biomedical Applications of Lasers - Cancer Tissue
- Biomedical Applications of Lasers - Dental Surgery
- Biomedical Applications of Lasers - Dermatology
- Biomedical Applications of Lasers - Microsurgery
- Biomedical Applications of Lasers - Neurosurgery
- Biomedical Applications of Lasers - Photo-Coagulation of Retinal Holes
- Biomedical Applications of Lasers - Retinal Tumor Treatment
- Biomedical Applications of Lasers - Spectroscopic Analysis
- Biomedical Applications of Lasers - Vision Research
- Communications
- Cutting:Laser Cutting
- Holography
- Ionization Gases by Laser Beams
- Laser Application:Gyroscope
- Laser Applications:Micromachining
- Laser Applications:Range Finder
- Laser Applications:Welding
- Lensless Photography
- Scaling:Laser Scaling
- Scribing:Laser Scribing
- Trimming:Laser Trimming
- Vaporizing:Laser Vaporizing
- Welding:Laser Welding

Microwaves

- Microwave Pumping
- Phase Shift

Optics

- Narrow Beam
- Optical Alignment

Plasmas and Gaseous Discharges

- Buffer Gas
- Polishing Ionic Polishing
- Stream

Solid State Physics

- Cleavage of the Crystal
- Doped
- Impregnated
- Stoichiometric Melt
- Thin Films
- Tunnel Injection
- Valence Band

DEVICES

Cavities

- Aperture
- Chamber
- Concave Mirrors
- Concentric Cavity
- Corner-Cube Reflector Cabity
- Cylindrical Cavity
- Double Cavity
- Elliptical Cylinder
- Half Silvered Mirror
- Plane-Concentric Resonator
- Plano Concave Cavity
- Resonant Cavity
- Rotating Prism
- Spherical Mirrors
- Tuned Cavity
- Widely Tuned Cavity

Communications

- Antenna
- Oscillator
- Quartz Oscillators

Laboratory Equipment

- Amplifier
- Bolometer
- Calori eter
- Calorimeters Differential Scanning Calorimeters
- Chromatographs
- Deionizer
- Dewar
- Discriminator
- Focusing Electrodes
- Heat Sink
- Magnet
- Meter:Laser Power Meter
- Paramagnetic Amplifier
- Photodiode
- Photo Multiplier Tube
- Pin Photodetector
- Poles
- Radiometer
- Spectrophotometers
- Superconduction Magnet
- Transducer
- Vacuum Pump
- Xenon Flash Lamp

Laser

- Gas Ring Laser
- Gaseous Laser
- Head Laser Head
- Injection Laser
- Liquid Laser
- Optical Maser
- Quantum Amplifier
- Quantum Oscillator
- Solid State Laser
- Pulsed Lasers
- X Ray Laser

Laser Applications

- Acoustic Delay Line Laser

Maser

- Ammonia Maser
- Atomic Clock
- Atomic Hydrogen Maser
- Chromium-Doped Rutile Maser
- CS Atomic Beam Maser
- Maser Rubies
- Pump Frequency
- Regenerative Rubidium Oscillator
- Ruby
- Traveling-Wave Maser

Microwaves

- Circulator
- Dielectric Waveguides
- Directional Couplers
- Isolator
- Magnetron
- Microwave Amplifier
- Transmission Line
- Waveguide

Optics

- Acrylic Optics
- Band Pass Filter
- Beamsplitter
- Collimator
- Dichroic Output Coupler
- Diffraction Grating
- Etalon
- Fabry-Perot Etalon

DEVICES (CONT'D)

Optics (cont'd)

- Fiber Optics
- Grating
- Interference Filter
- Interferometer
- Interferometric Gratings
- Lens
- Lens; Aspheric Lens
- Light Pipes
- Mach - Zehnder Interferometer
  Schlieren System
- Mask
- Mirrow Littrow - Prism Mirror
- Parallel Plate Polarizer
- Prism
- Quarter Wave Plate
- Schlieren Disks
- Slit
- Wollaston Prism; Digital Light
  Detectors
- Zone - Plate

Plasmas and Gaseous Discharges

- Doppler Cell
- Evacuated Chamber
- Mica Windows
- Tight Chamber
- Vacuum Chamber
- Vacuum System

Solid State Physics

- Semi Conductor Diode

PROPERTIES

Atomic, Molecular and Electron Physics

Collisions
Collision of the First Kind
Collision of the Seccnd Kind
Coupled Electrons
Frequency Splitting
Ground - State Hyperfine Splitting
Hyperfine Transition Frequency
Molecular Excitation
Molecular Response
Pi Polarized
Nuclear Hyperfine Splitting
Rotational Transitions
Spin - Orbit Coupling
Vibrational Transitions

Cavities

Band Width
Beat
Beat Frequency
Center Frequency
Coupled
Damping
Frequency Locking
Frequency Pulling
Frequency Pushing
Frequency Shift
Geometry of the Cavity
High Q
Intra - Cavity
Longitudinal Modes
Low Q
Mode Competition
Mode Suppression
Normal Modes
Pass Band

Cavities (cont'd)

Quasimode
Reflectance
Resonant Modes
Resonance Oscillations
Ringing
Transverse Modes
Tuned
Q

Communications

Emission Noise
Phase
Power Gain
Power Loss
Propagation
Random Phase

PROPERTIES (CONT'D)

Environmental Conditions

- Current Densities
- Electron Density
- Gas Pressure
- High Pressure
- Liquid Helium Temperature
- Liquid Hydrogen Temperature
- Liquid Nitrogen Temperature
- Noise
- Noise Figure
- Noise Limit
- Noise Temperature
- Population
- Power Level
- Pressure
- Room Pressure
- Temperature

Interaction of Light with Matter

- Absorption
- Absorption Line
- Atmospheric Scattering
- Atomic Transition
- Birefringence
- Branching Ratios
- Cascade
- Decay
- Decay Rate
- Decay Time
- Emission Line
- Energy Difference H Nu
- Induced Absorption
- Induced Emission
- Inversion Ratio
- Lifetime
- Optical Transition
- Oscillator Strenght
- Photoelectric Effect
- Photon - Phonon Scattering Process
- Radiative Recombination
- Scattering
- Spectra
- Spontaneous Emission
- Spontaneously Radiate
- Stimulated Emission
- Superradiation
- Thermally Induced Emission
- Thompson Scattering
- Transition

Laser

- Field Strength
- Extra-Ordinary Frequency Stability
- Giant Pulses
- Monochromatic Waves
- Self Sustained Oscillation
- Spiking
- Quantum Efficiency
- Threshold

Laser Applications

- Raman Scattering
- Second Harmonic Generation

Microwaves

- Microwave Frequency
- Microwave Input
- Microwave Output
- Microwave Power
- Transmissions

Optics

- Collinear Polarization
- Electrooptic Birefringence
- Electro - Optic Effect
- Fringe
- Fringe Maxima
- Fringe Minima
- Interference Fringes
- Macroscopic Polarization
- Refraction
- Polarization
- Resolution

Physical Effects

- Cathodoluminescence
- Faraday Rotation
- Doppler Effect
- Diffusion
- Hanle Effect
- Piezo - Electric Effect
- Penning Effect
- Saturation
- Stark Effect
- Tunnel Effect
- Zeeman Effect

PROPERTIES (CONT'D)

Plasmas and Gaseous Discharges

- Afterglow
- Cold Cathode Discharge
- Doppler Broadening
- Doppler Frequency
- Doppler Shift
- Doppler Width
- Flow
- High Pressure Discharges
- Line - Narrowing
- Line - Width
- Low Pressure Discharges
- Negative Glow Region
- Striations
- Tube Bore
- Tube Diameter

Radiation

- Coherent
- Electromagnetic Energy
- Enhancement
- Far Infrared
- Infrared Radiation
- Intrinsic Noise Temperature
- Intensity
- Irradiation
- Monochromatic Light
- Microwave
- Near Infrared
- Photoelectric Flux
- Polychromatic Light
- Quantum Fluctuations
- Radiation Field
- Radiation Intensity
- Random Thermal Field
- Spatial Coherence
- Spectral Energy Distribution
- Ultraviolet Radiation

Solid State Physics

- Axial
- Avalanche Emission
- Band - To - Band Recombination
- Band - To - Band Transition
- Carrier Concentration
- Crystal Lattice
- Crystal Z Axis
- Degenerate

Solid State Physics (Cont'd)

- Donor Type Layor
- Edge Emission
- E M P Effect Int Semi Cond In X E+M Field Emits Recombination Radiation
- Energy Exchange
- Energy Band Gap
- Epitaxy
- Impurity
- Intrinsic Semiconductors
- Isomorphous Salt
- KDP Potassium Dihydrogen Phosphate
- Monocrystalline
- Non Degenerate
- Non Linear Crystal
- N Type Region
- Pair Emission
- P Type Region
- Phosphor
- Spin Lattice Relaxation Time
- Tunneling Electrons
- Zener Breakdown
- Zener Emission

Thermodynamics

- Adiabatic
- Black Body
- Entropy
- Thermodynamic Equilibrium
- Thermal Noise Limit

Waves

- Acoustic Waves
- Electromagnetic Waves
- Electric Polarization
- Maxwell's Equations
- Plane Wave
- Standing Wave
- Wavefront
- Wave length

PROPERTY OR STATE OF MATTER AND SYSTEMS

Property or State of Matter and Systems

- Anisotropy
- Conductivity
- Diamagnetic Materials
- Elastic Stress
- Electroluminescence
- Emulsion
- Ferromagnetic Materials
- Hysteresis
- Index of Refraction
- Liquid Air
- Luminescence
- Nonlinear Media
- Paramagnetic Materials
- Photoluminescence
- Refractive Index
- Stable
- Susceptibility
- Unstable

MATHEMATICAL ENTITIES

Cavities
Brewster Angle
Auto Correlation
Cross Correlation
Determinantal Equation
Fourier Series
Linear Combination
Rate Equations

Optics

- Diffraction Theory
- Huygens Principle
- Interference Theory

Theoretical Models

- Born Approximation
- Ensemble
- Ensemble of Atoms
- Ensemble of Molecules
- Ensemble of Oscillator Elements
- Gaussian Distribution
- Lorentzian Function
- Maxwellian Distribution
- Negative Temperature
- Spin Temperature
- Stationary
- Statistically Uncorrelated
- Self - Consistency
- Time - Dependent Perturbation Theory
- Velocity Distribution Function
- Virtual Transitions