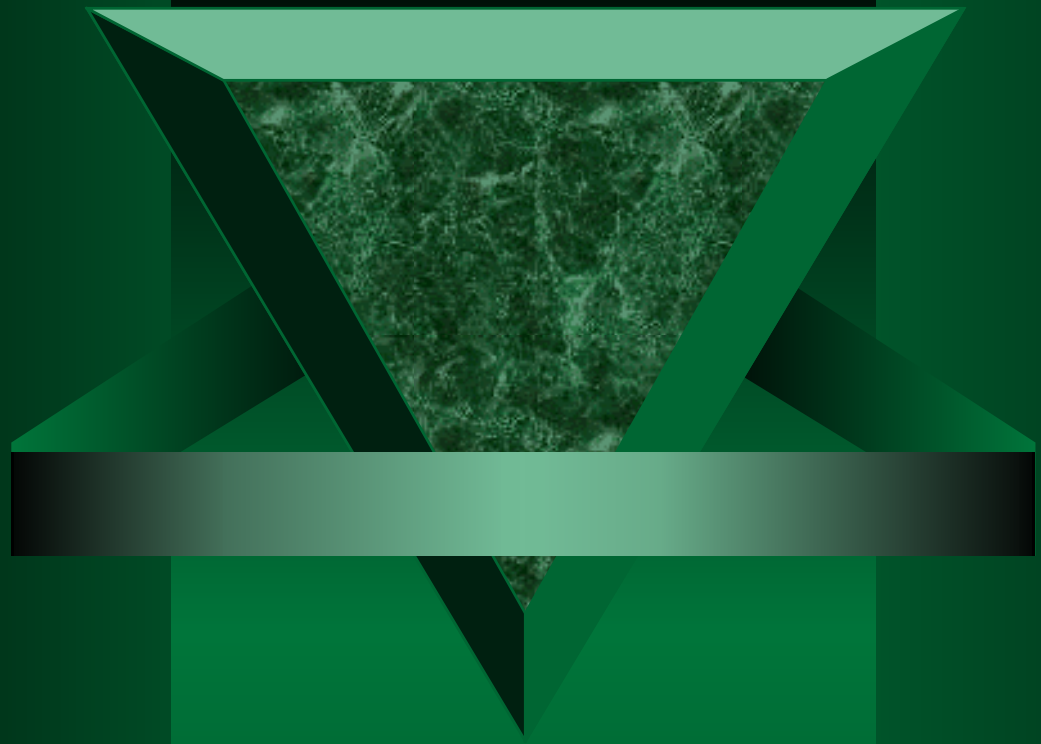


Science and Technology on Health and the Environment

Mission

“Technologies should clean up the pollution they create and to improve the quality of life through medical advances. We should leave the world a better place than we found it so that for generations to come, our children will be able to live in an environment that is safe and clean.”

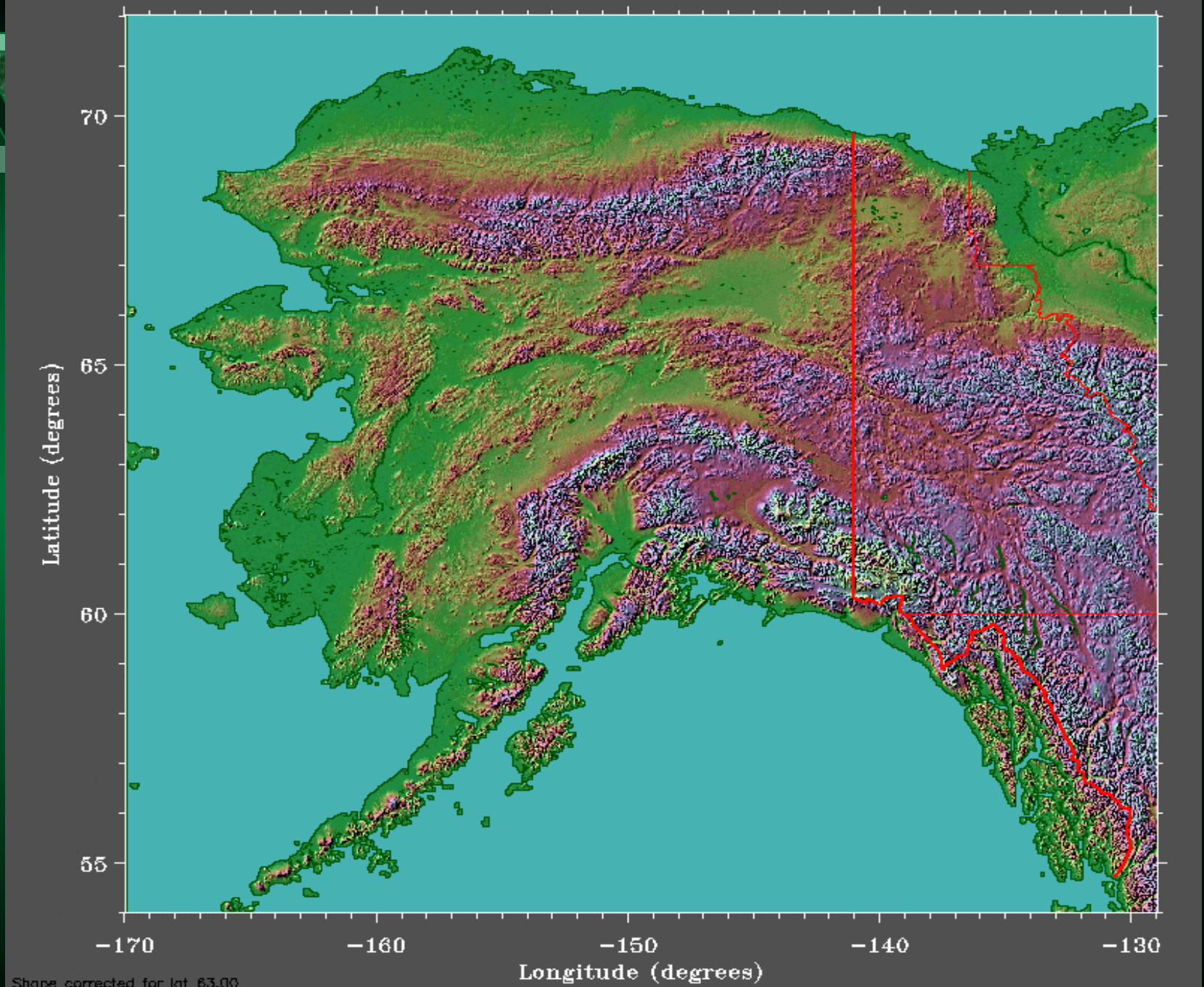
Critical Problems

1. Global Warming
2. Depletion of Protecting Ozone Layer
3. Hazardous Wastes
4. Harmful Wireless Radiation
5. Lack of Clean Energy Sources
6. Cancers

Picture taken by Jan Curtis

Picture taken by Jan Curtis


Alaska
Arctic Ocean
Barrow
Wainwright
Beaufort Sea
NUNAVUT
Great Bear L.
Prudhoe Bay
Umiat
Point Hope
Arctic Circle
RUSSIA
65° N
Arctic Village
CANADA
Kotzebue
Shungnak
Fort Yukon
Mackenzie R.
Bering Strait
Teller
Circle
Galena
Nome
Fairbanks
N.W. TERR.
Unalakleet
Anderson
Delta Junction
Yukon R.
Healy
YUKON TERRITORY
Bering Sea
Tok
McGrath
Talkeetna
60° N
Glennallen
Yukon R.
Aniak
Wasilla
Palmer
Bethel
Anchorage
Valdez
B.C.
Kenai
Skagway
Eek
Haines
Seward
0 200 Miles
Homer
Juneau
0 200 Kilometers
Naknek
Gulf of Alaska
Petersburg
Bristol Bay
Kodiak
Sitka
Wrangell
55° N Latitude
Kodiak Island
Ketchikan
Aleutian Islands
Pacific Ocean
Dutch Harbor
165° W
160° W
155° W
150° W
145° W
140° W
135° W Long.



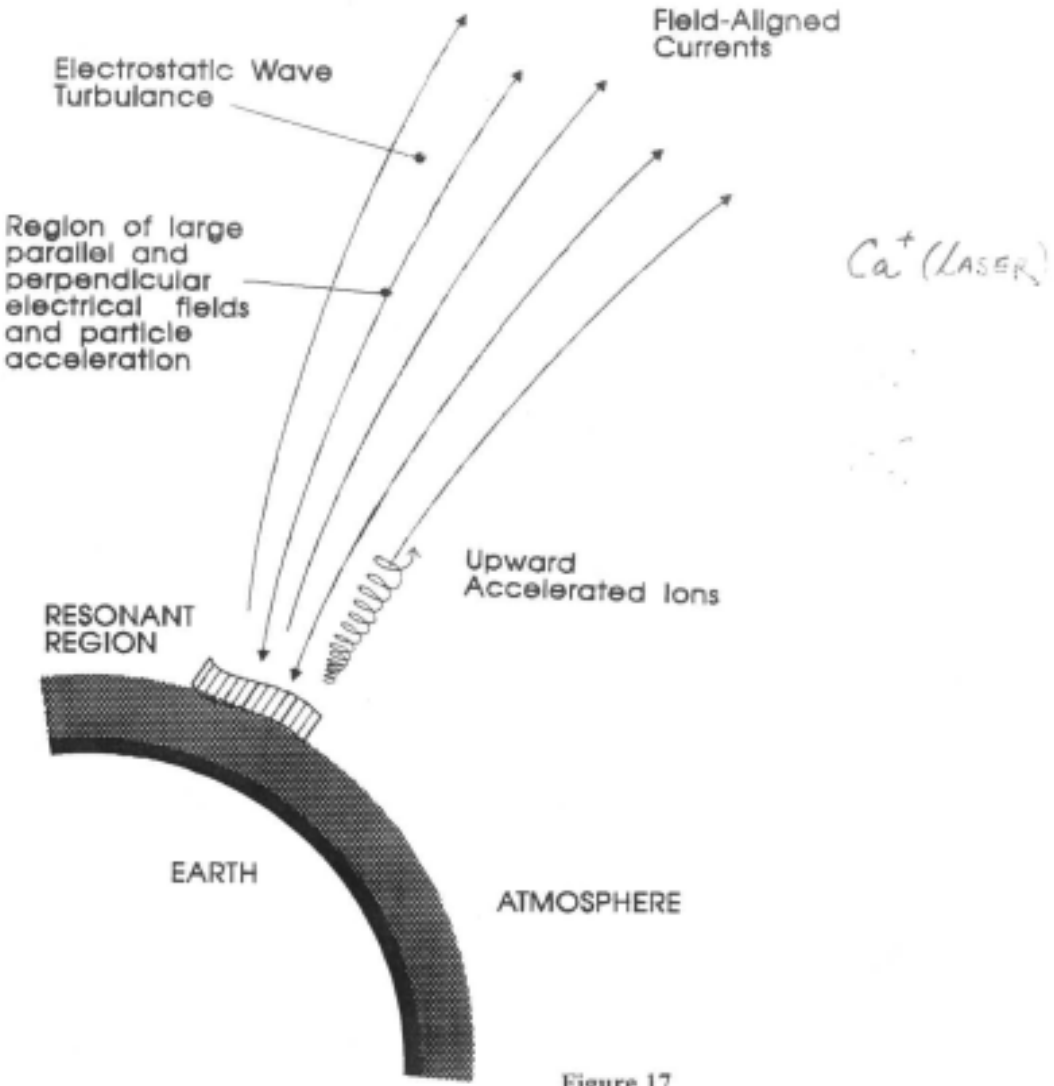

Field-Aligned
Currents
Electrostatic Wave
Turbulance
Region of large
parallel and
perpendicular
electrical fields
and particle
acceleration
Ca+ (LASER)
Upward
Accelerated Ions
RESONANT
REGION
EARTH
ATMOSPHERE

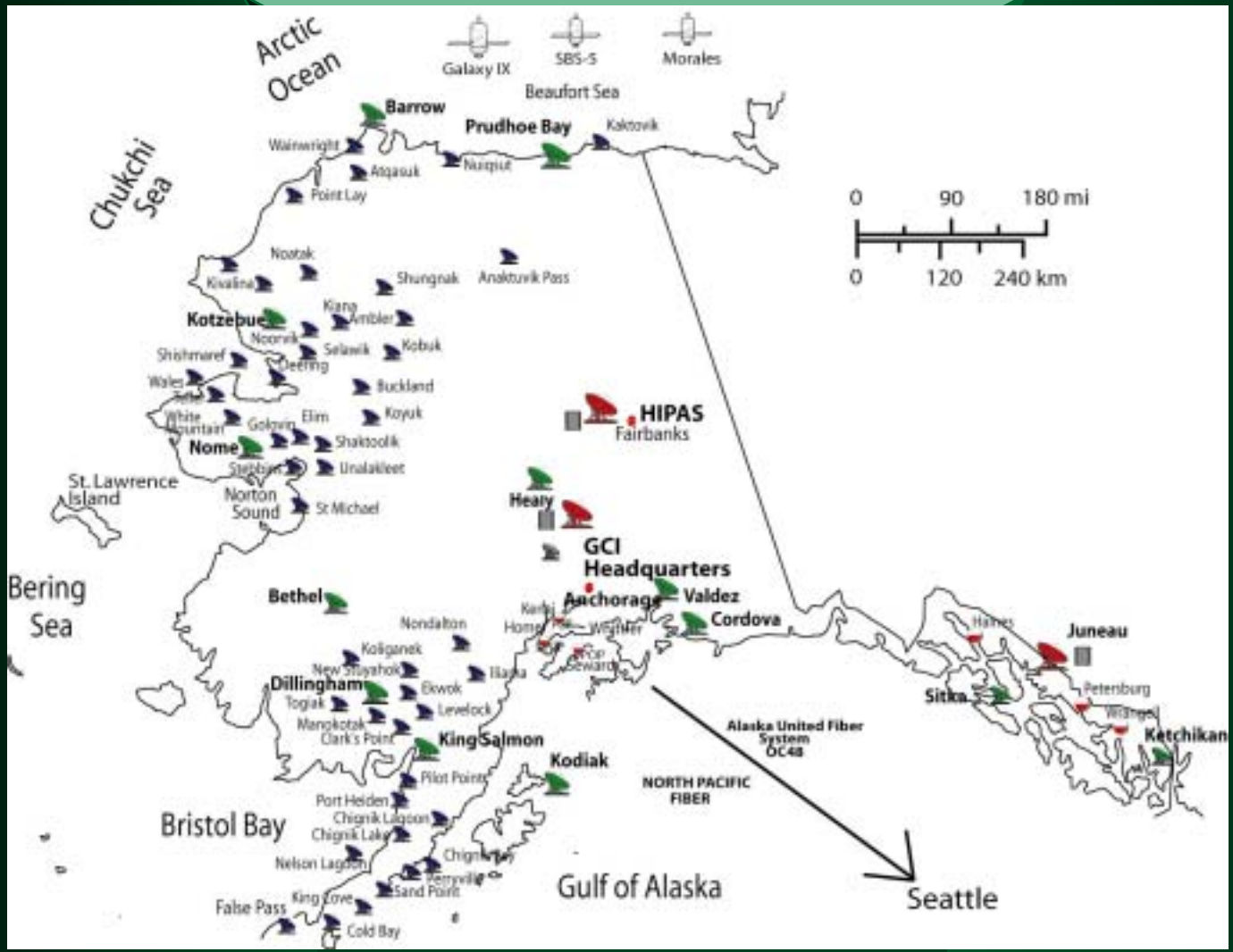
Figure 17

Outdoor Environmental Facility in Alaska. 120 acres.

1. Remediation of Depletion of Ozone layer.
2. Ejection of Green-house gases.

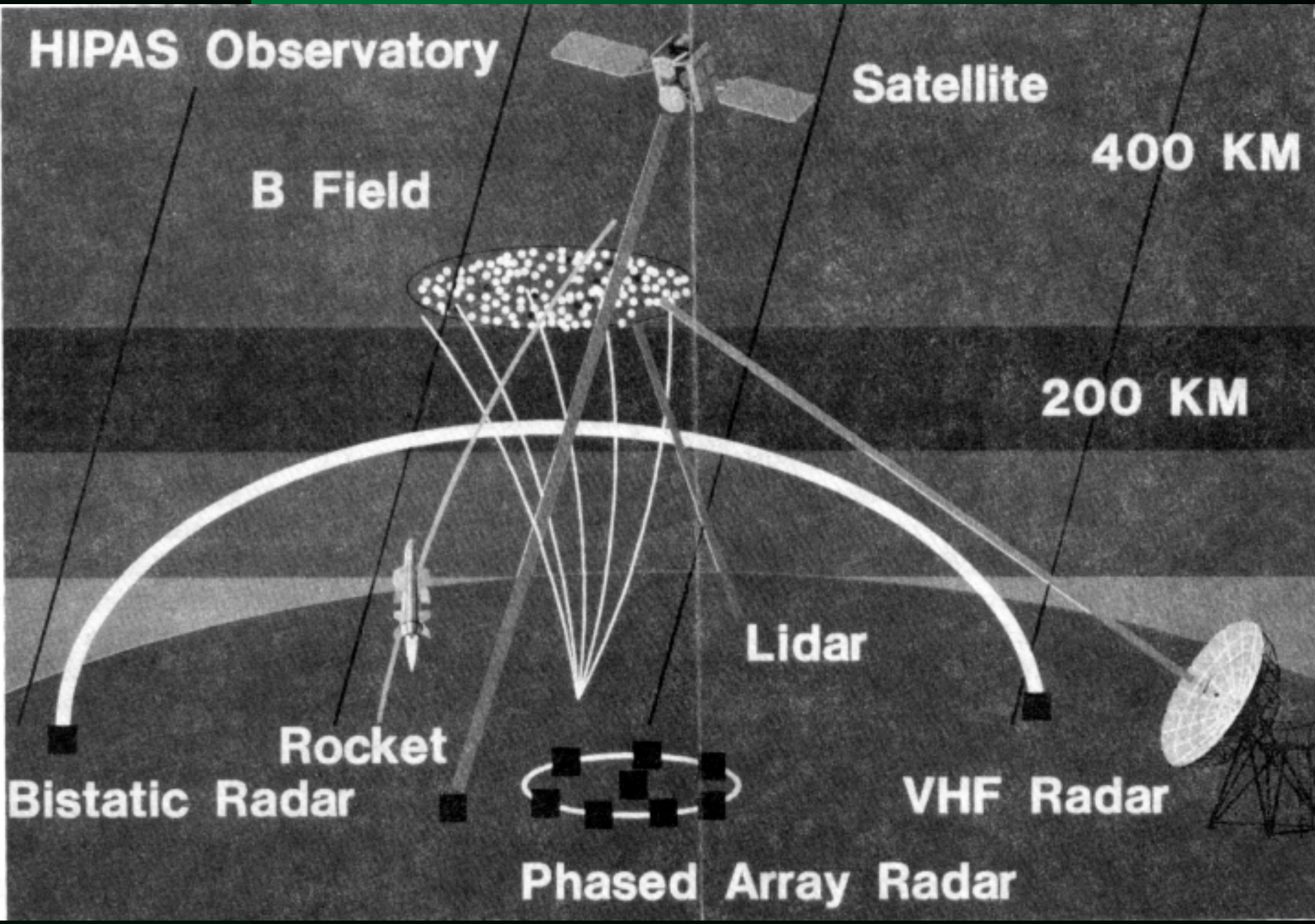
Enabling Critical Science and Technology

- *Understand and Imitate Nature*
- Control of Dynamics of Electrons, Ions , Neutrals.
- Physics of Nonlinear Wave-Particle Interactions.



Location of commercial communications receiver sites in Alaska.

HIPAS OBSERVATORY


HIPAS Observatory
Satellite
400 KM
B Field
200 KM
Lidar
Rocket
Bistatic Radar
VHF Radar
Phased Array Radar

HIPAS Lidar

- Photograph of the HIPAS lidar building taken 11/21/2000 with a camera looking to the north (ASA 200 film, f/2.8, 5 minute exposure).

Mirror

- 2.7 diameter rotating mercury mirror at HIPAS.
- Project Leader: Dr. Ralph Wuerker

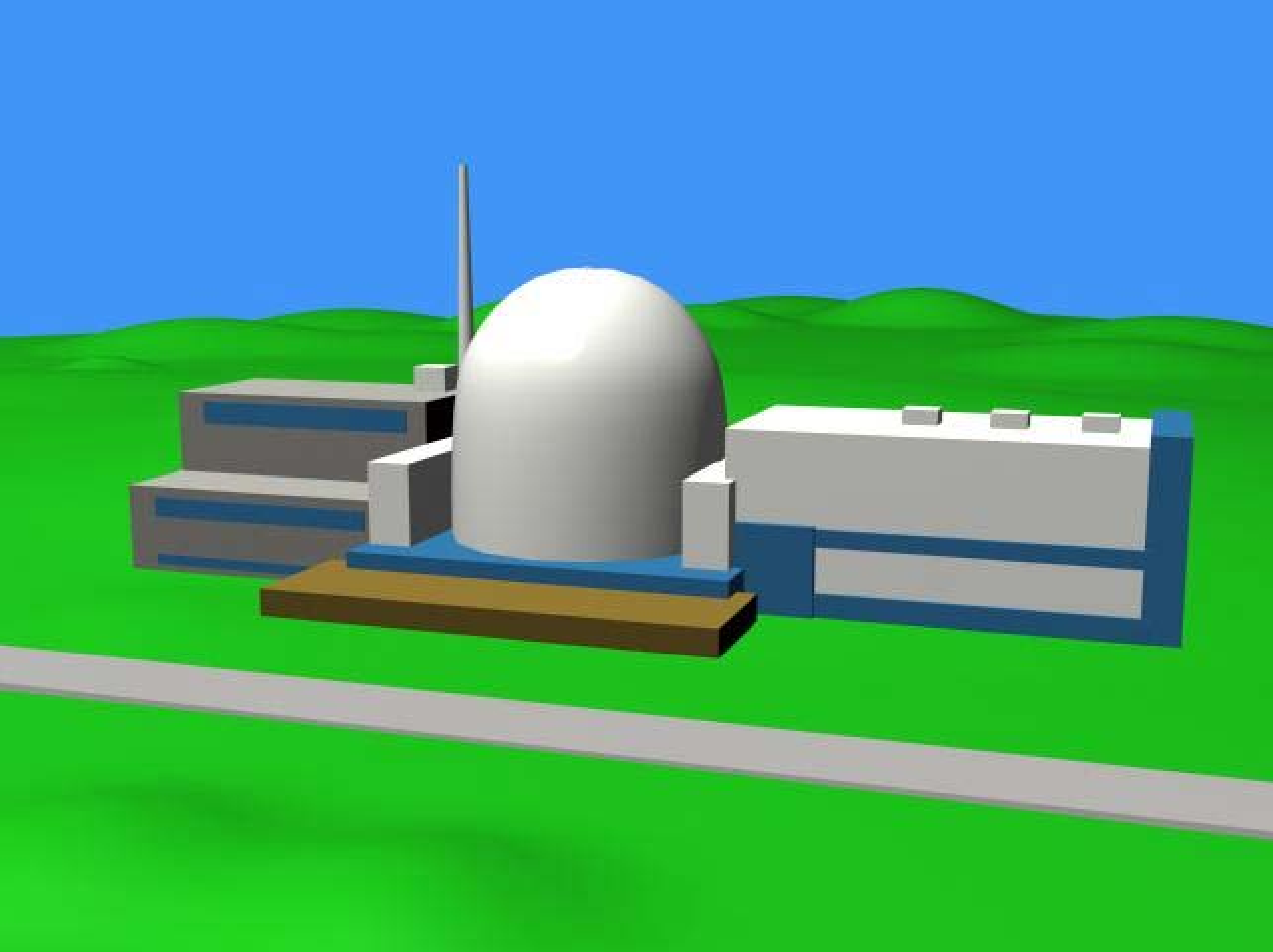
Optical Observations collected at HIPAS

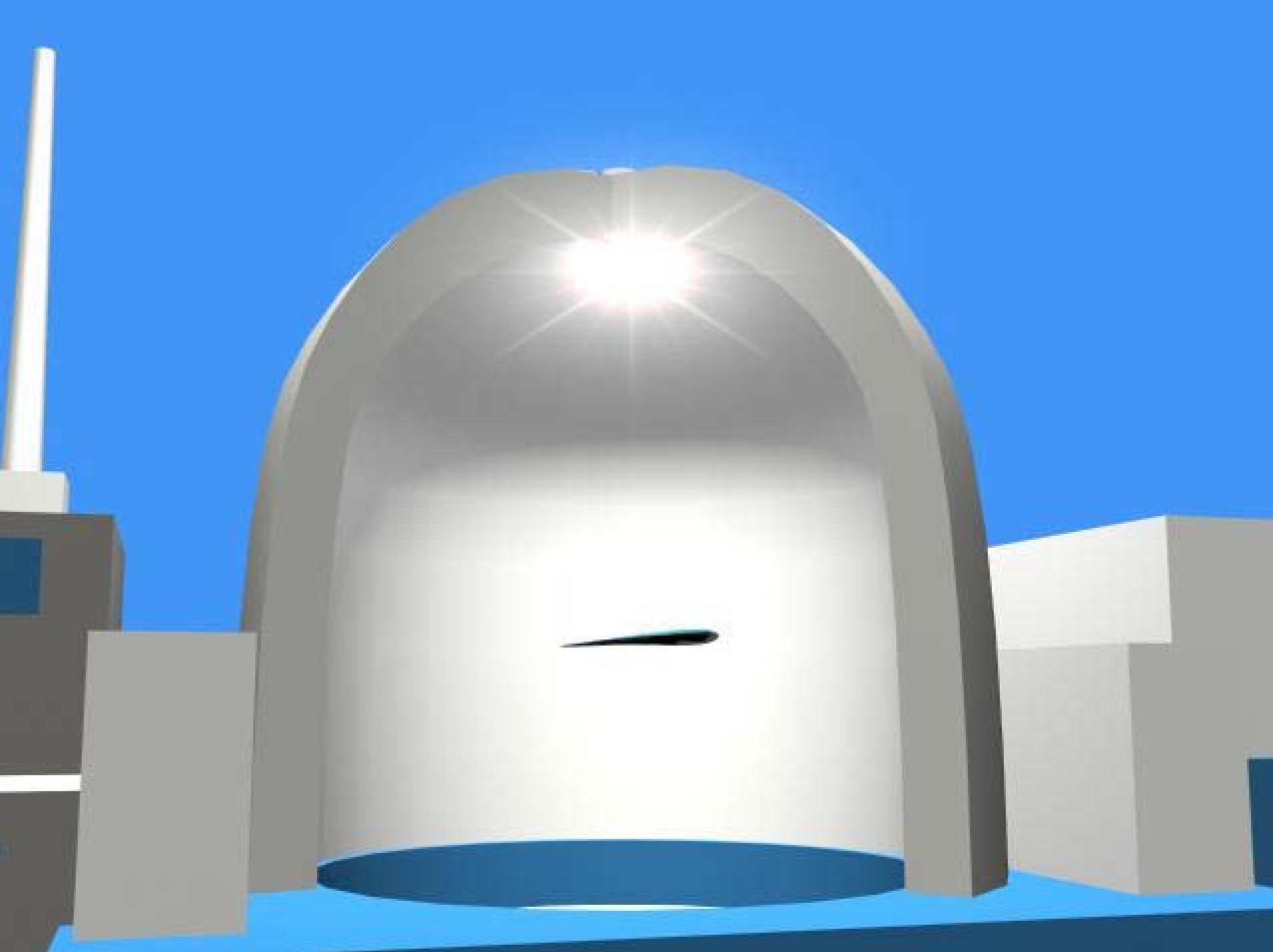
HIPAS 6,7 Mar

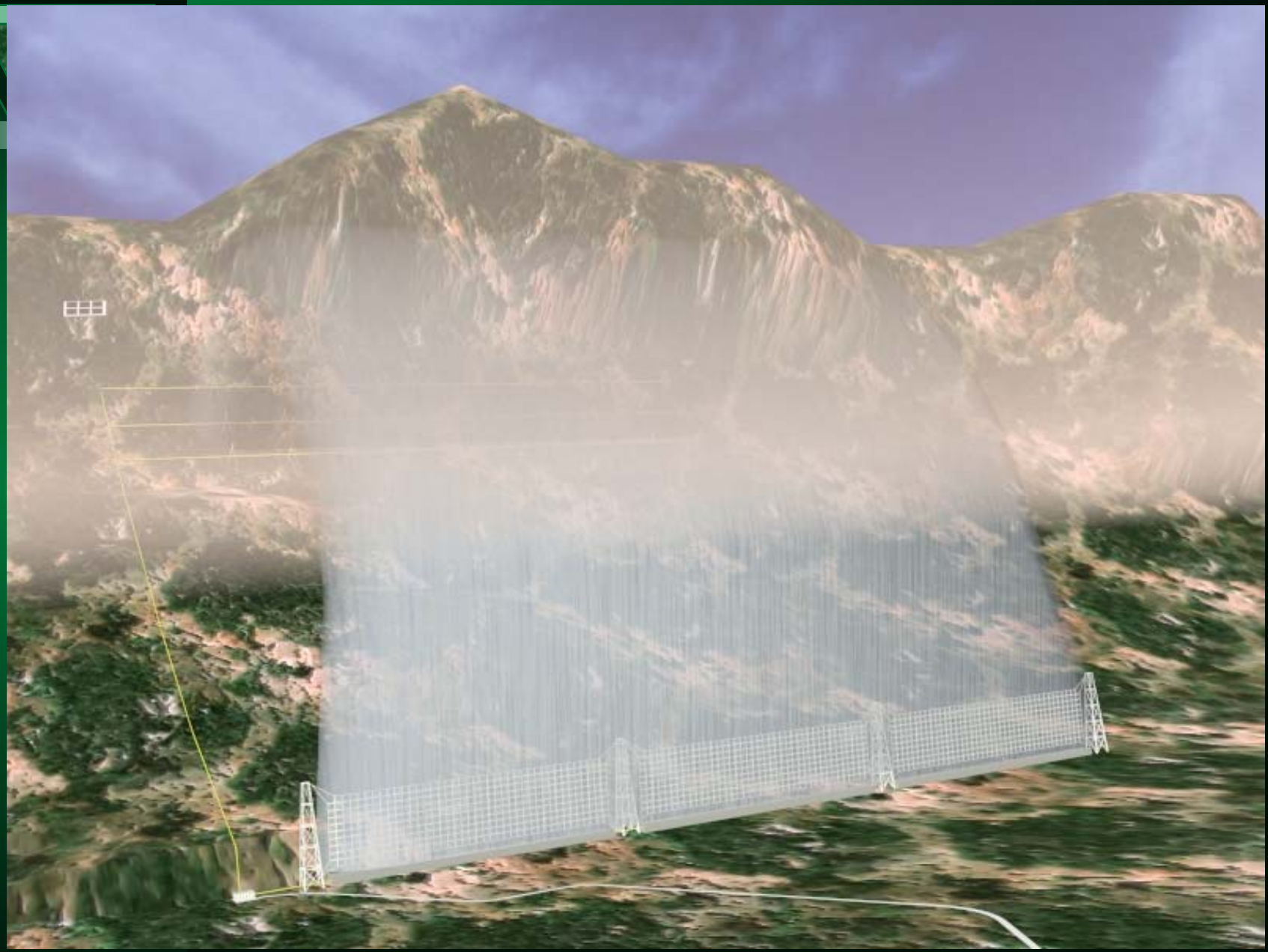
EM waves are able to interact with atmospheric electrons which emit light as they collide with neutrals and ions at resonant height

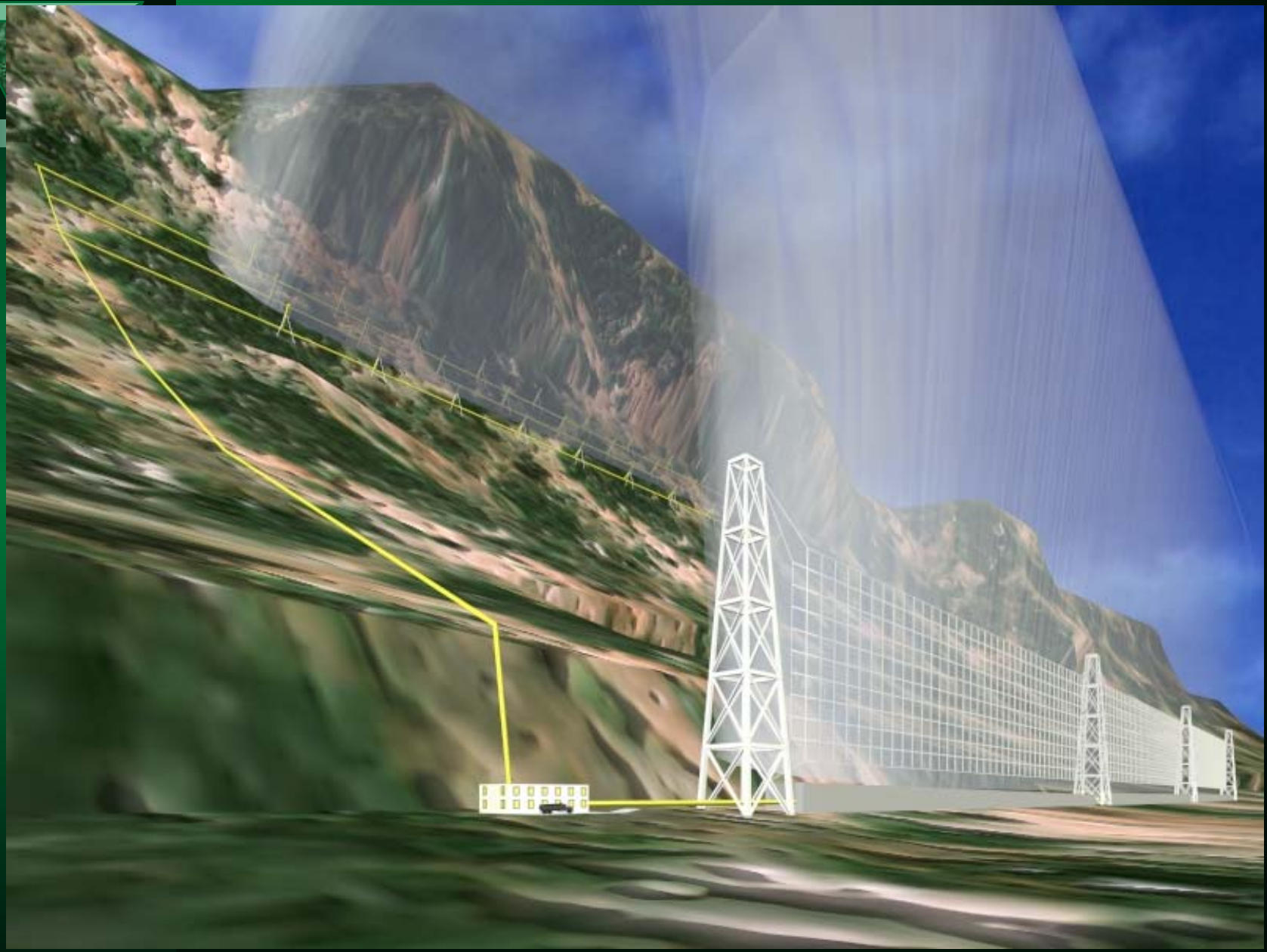
Wuerker and Sentman

HIPAS 19, 20 Mar









Enabling Critical Science and Technology

- Ion-Neutral Coupling in control of neutral dynamics.
- Wave-Particle acceleration in Micro and Nano Plasmas.
- Nonlinear states “Cavitons” replacing for short-lived particles such as Muons.

Inventions

- Nonlinear Ion Propulsion Engine & Global Network of Astroplatforms
- Micro-ion-engine for material processing
  - Plasma Torch and Isotope Separator
  - Casetenna & Etenna
- Cordless phones with redirected radiation

New Concepts

- AstroPlatforms in the Atmosphere for in-situ monitoring and communication platforms.
- New Paradigm in using table-top activator of Stable Isotopes in PET imaging and Therapeutic treatment. Reduce risks of handling radioactive substances for Cancer treatment.
- New Approach to Nuclear Fusion without Radioactive Wastes.
- A new 3-D coding scheme to increase number of users within given frequency bandwidth.

Laboratory Facilities

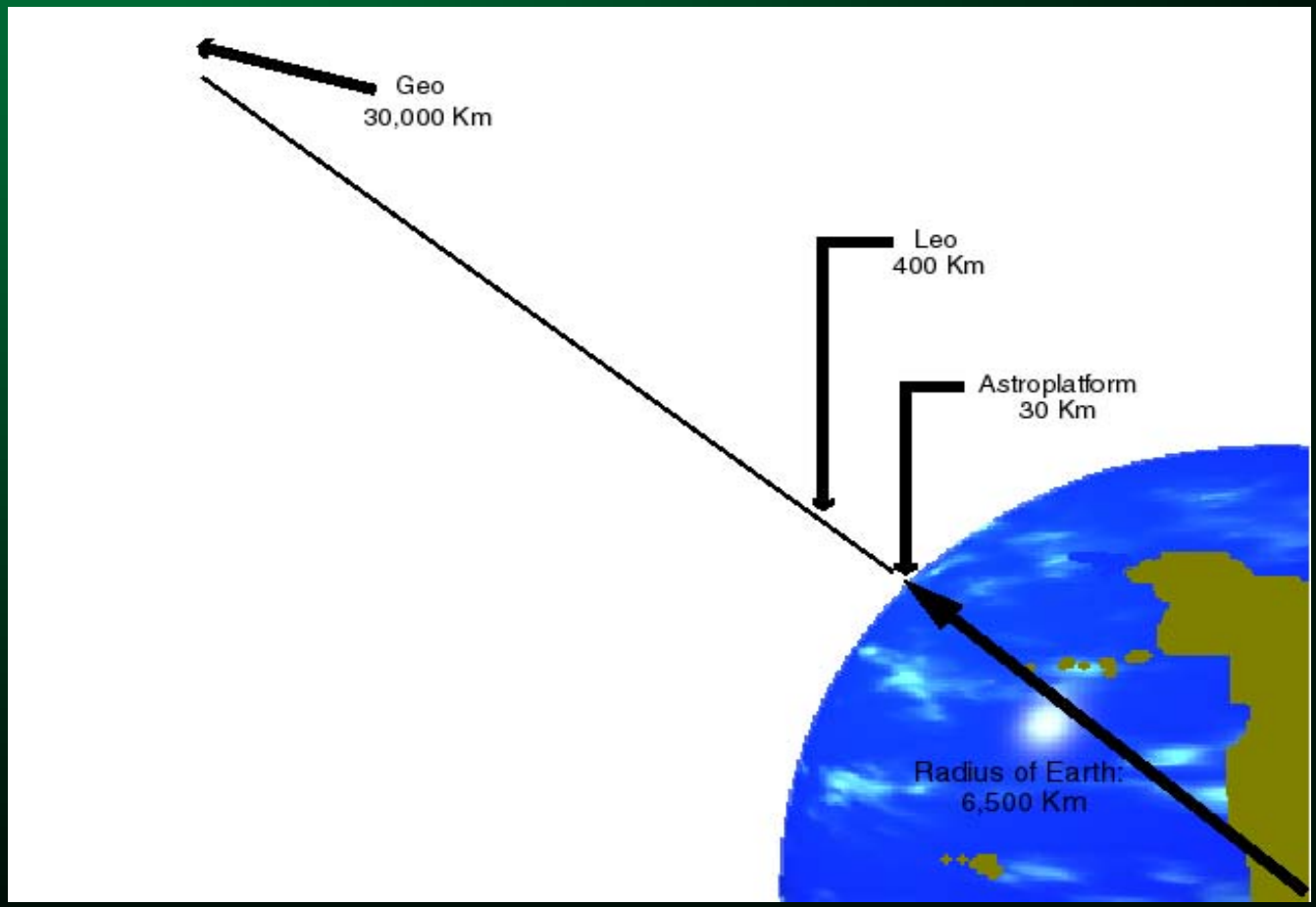
- **NASA Plum Brook Station, Ohio.**
- **Nanotechnology Research Facility, UCLA , California.**
- **HIPAS Observatory, Fairbanks, Alaska.**

Nonlinear Ion Propulsion Engine (“NIPE”)

Based on Wave-Particle Interaction Concept.

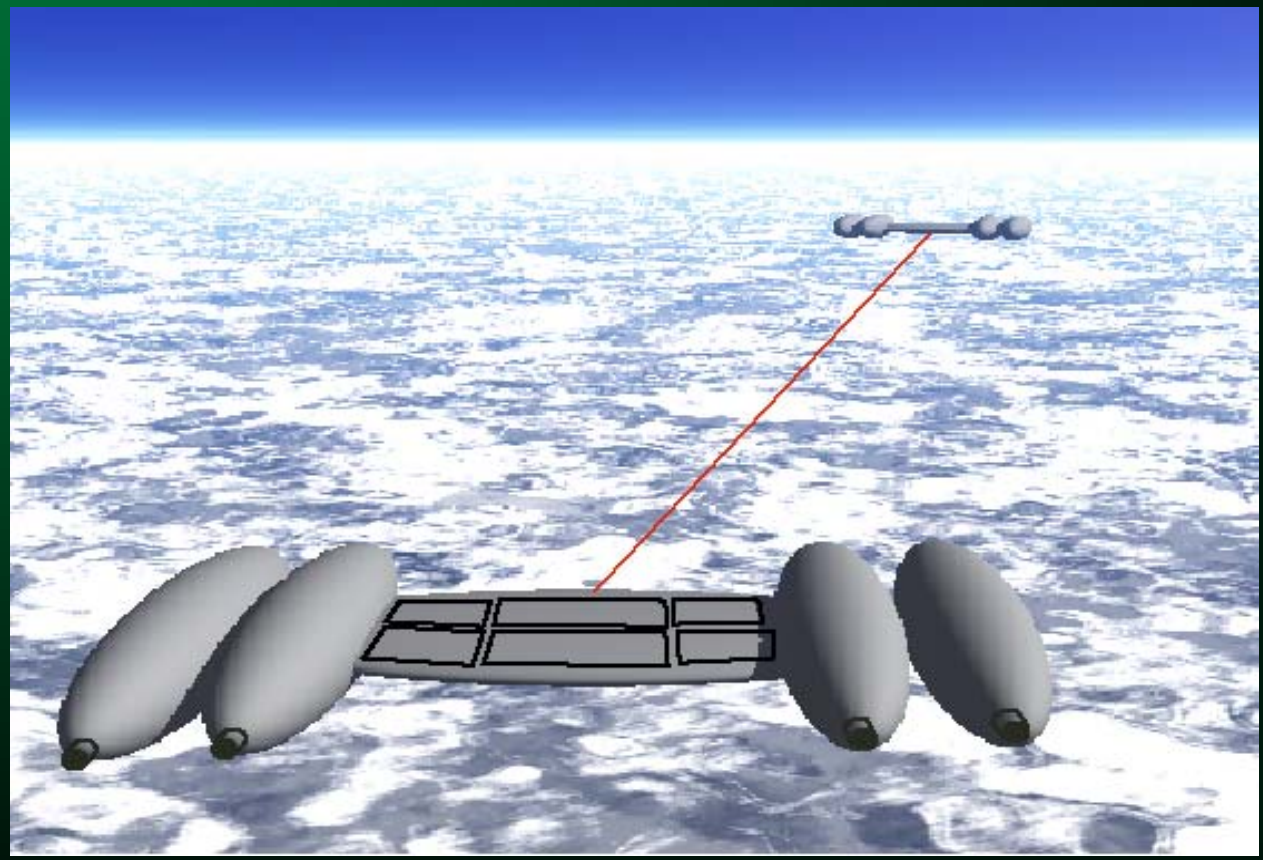
- Creates Thrust with Ionized Particles
- Uses Air as Fuel
- No Moving Parts
- Minimal Thermal Heat
- High Thrust to Weight Ratio
- Patent Rights Granted
- Usable at all pressures
- Approach limit of maximum efficiency

Nonlinear Ion Propulsion Engine (“NIPE”)



Nonlinear Ion Propulsion Engine (“NIPE”)

Nonlinear Ion Propulsion Engine ("NIPE")



Electron Plasma Torch

The Plasma Torch is a plasma produced by RF at atmospheric pressures. It operates at more than 2 million degrees.

1. Hazardous waste destruction, e.g. for dioxins and furans. Co-Generation of electricity.
2. Precious metal recovery and recycling.
3. Conversion of natural gas to transportable liquid.

Plasma Torch

View of the 100 kW rf plasma torch system at HIPAS, with automated control system.

RF PLASMA TORCH

GAS-TO-LIQUID CONVERSION:

The photo shows the inductively coupled plasma column "floating" within its confinement wall in a 100 kW torch.

Plasma Torch

Applications:

1) Destruction of Dioxins

- Municipal solid waste incinerators almost always produce dioxins and furans.
- These are among the most toxic compounds known to man.
- It is effective in hazardous waste minimization, treatment, and energy valorization.
- We have achieved successful destruction of Dioxins according to EPA protocols.

Plasma Torch

Applications:

2) Platinum group metals

- Use in recovery of Platinum group metals
- Include gold, platinum, iridium, ruthenium, rhodium and palladium
- Rhodium is used as a catalyst in automobiles and in the electronics industry
- The Torch uses electrons, ions and UV radiation in the recovery process.

Plasma Torch

- Thermodynamic considerations show that at low temperature and high pressure the trend is towards the formation of liquid from gaseous state.
- Radicals such as CH_3 and H injected into large volume of CH_4 catalyze formation of long-chain molecules which become the liquid state.
- The torch is compact and can be mounted on a truck or trailer for ease of movement to remote locations.

SafeCell™ Wireless Technology

- Redirect radiation of cell phone from user's head. This is made possible by invention of compact high dielectric materials.
- Efficiency of phone is also improved.

SafeCell™ Wireless Technology

Phase 1 Product:

- Leather case with integrated SafeCell™ antenna.
- Product is ready to market immediately.
- Sold as an accessory to a cell phone.
- SafeCell connector plugs into telephone's external antenna, enabling the SafeCell device in 30 seconds
- Initial cases for Nokia™, Erickson™, Qualcomm™ and Nextel™.

Patents Awarded

1. Electronic Conference Monitoring System, US Patent Number: 3,750,137 Date of Patent: July 31, 1973. Inventors: Alfred Y. Wong, James M. Nuding and Zolton J. Lucky PATENT

2. Electrodeless Plasma Torch Apparatus and Methods for the Dissociation of Hazardous Waste, US Patent Number: 5,288,969. Date of Patent: Feb.22, 1994. Alfred Y. Wong and Andrus Kuthi PATENT

3. System and Method for Remediation of Selected Atmospheric Conditions and System for High Altitude Telecommunications, US Patent Number: 5,678,783. Date of Patent: Oct. 21, 1997. Inventor : Alfred Y. Wong.

4. System and Method for Remediation of Selected Atmospheric Conditions, US Patent Number: 5,912,396 . Date: Jun. 15, 1999 . Inventor: Alfred Y. Wong.

5. Isotope Separation Using a High Field Source and Improved Collectors, US Patent Number: 5,981,951. Inventors: Alfred Y. Wong and Glenn Rosenthal, Date of award: Nov. 9, 1999.

6. “Portable Telephone with Shielded Transmission Antenna” China Patent ZL00201423.8 filed on Feb 1, 2000 and awarded on Nov 4, 2000. Inventor: Alfred Y. Wong.

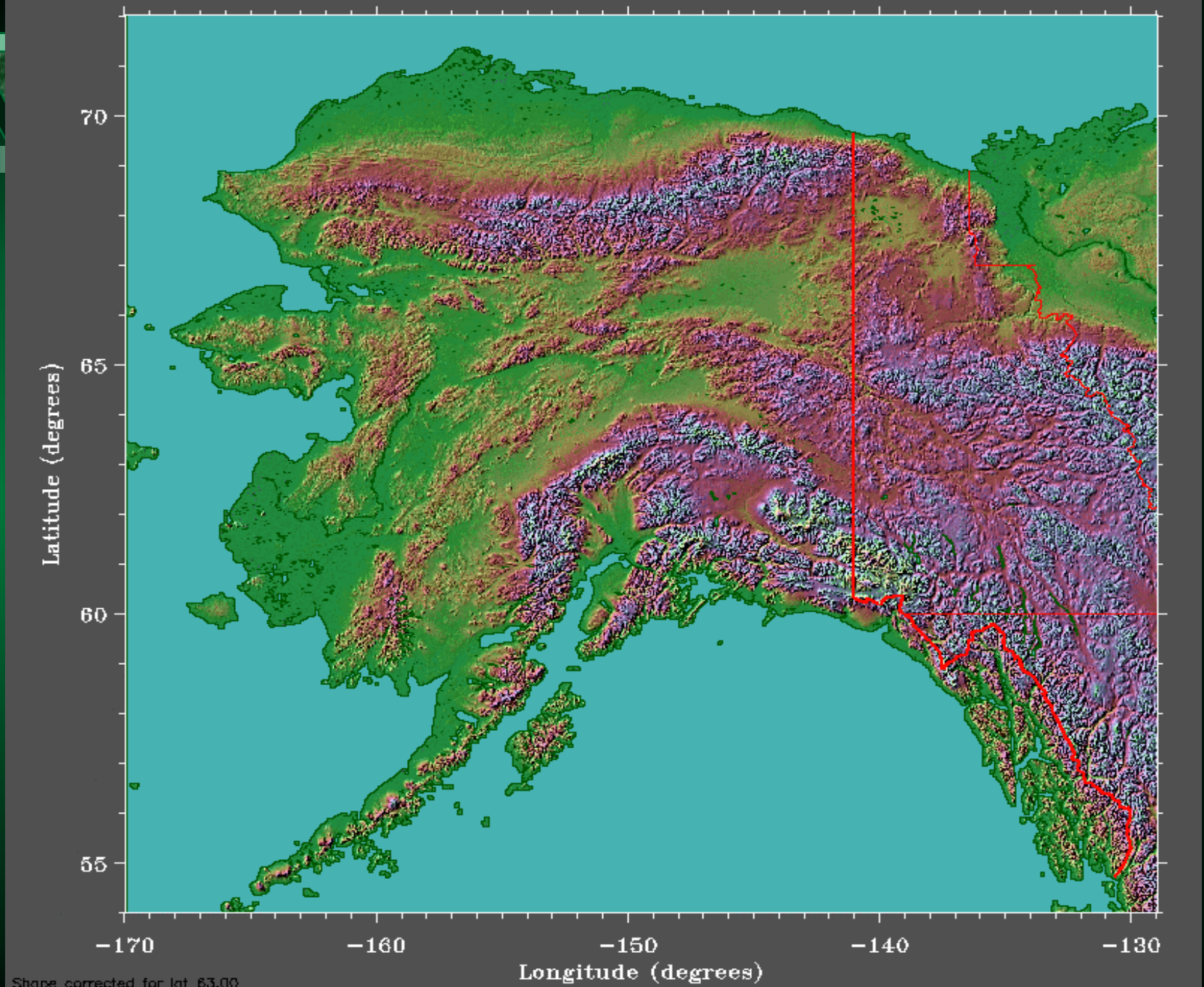
7. “Portable Telephone with Shielded Transmission Antenna” filed on Oct 21, 1999. Claims allowed by USPTO on July 23, 2001.

8. “A system of high-altitude lighter-than-air stationary platforms powered by corona ion engines for global and regional telecommunications.” Taiwan patent granted in 1999.

9. “Corona Ion Engines” Taiwan Patent No. 091489, issued on April 10, 1998

10. “Portable Telephone with Shielded Transmission Antenna” Patent awarded in Taiwan, 2001 , Inventor: Alfred Y. Wong


Alaska
Arctic Ocean
Barrow
Wainwright
Beaufort Sea
NUNAVUT
Great Bear L.
Prudhoe Bay
Umiat
Point Hope
Arctic Circle
RUSSIA
65° N
Arctic Village
CANADA
Kotzebue
Shungnak
Fort Yukon
Mackenzie R.
Bering Strait
Teller
Circle
Galena
Nome
Fairbanks
N.W. TERR.
Unalakleet
Anderson
Delta Junction
Yukon R.
Healy
YUKON TERRITORY
Bering Sea
Tok
McGrath
Talkeetna
60° N
Glennallen
Yukon R.
Aniak
Wasilla
Palmer
Bethel
Anchorage
Valdez
B.C.
Kenai
Skagway
Eek
Haines
Seward
0 200 Miles
Homer
Juneau
0 200 Kilometers
Naknek
Gulf of Alaska
Petersburg
Bristol Bay
Kodiak
Sitka
Wrangell
55° N Latitude
Kodiak Island
Ketchikan
Aleutian Islands
Pacific Ocean
Dutch Harbor
165° W
160° W
155° W
150° W
145° W
140° W
135° W Long.



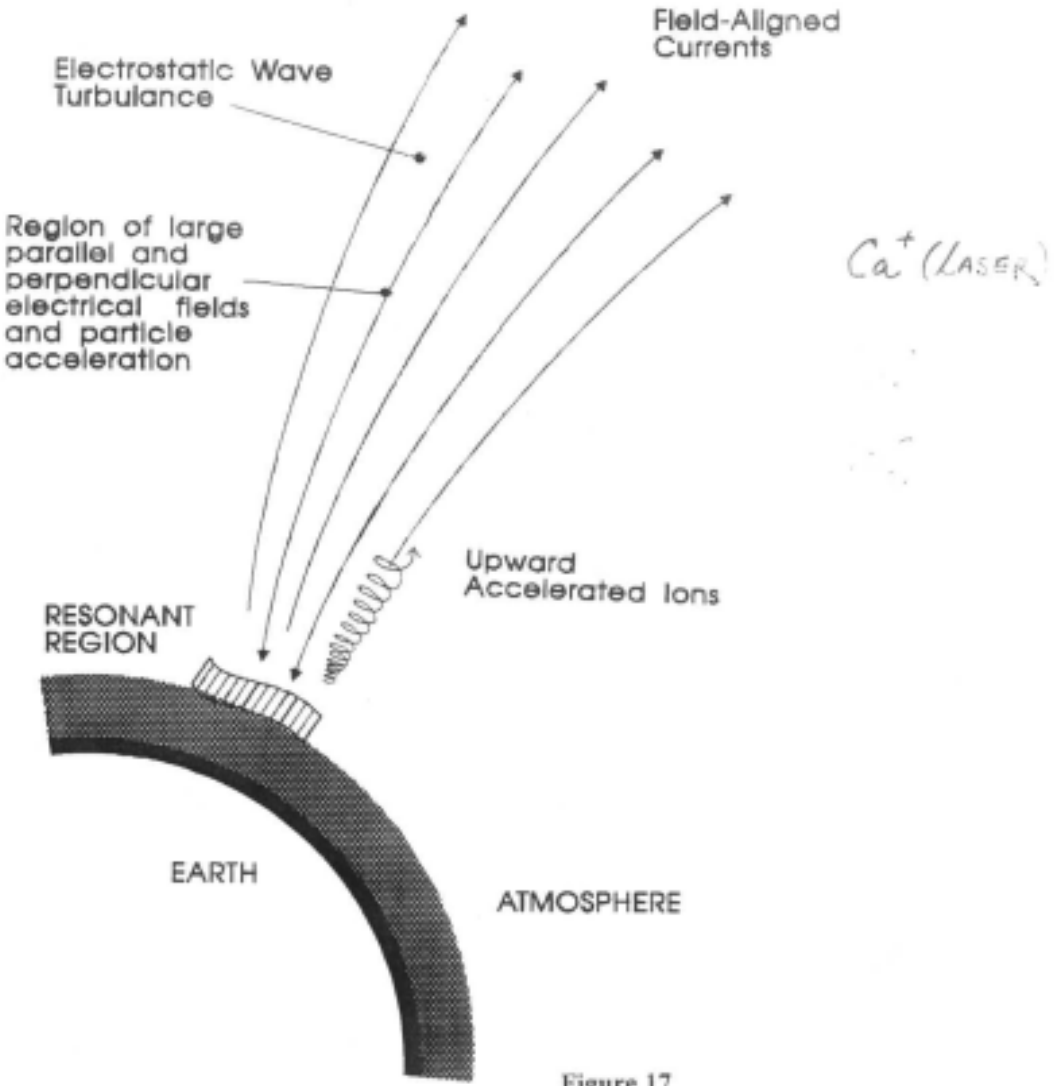
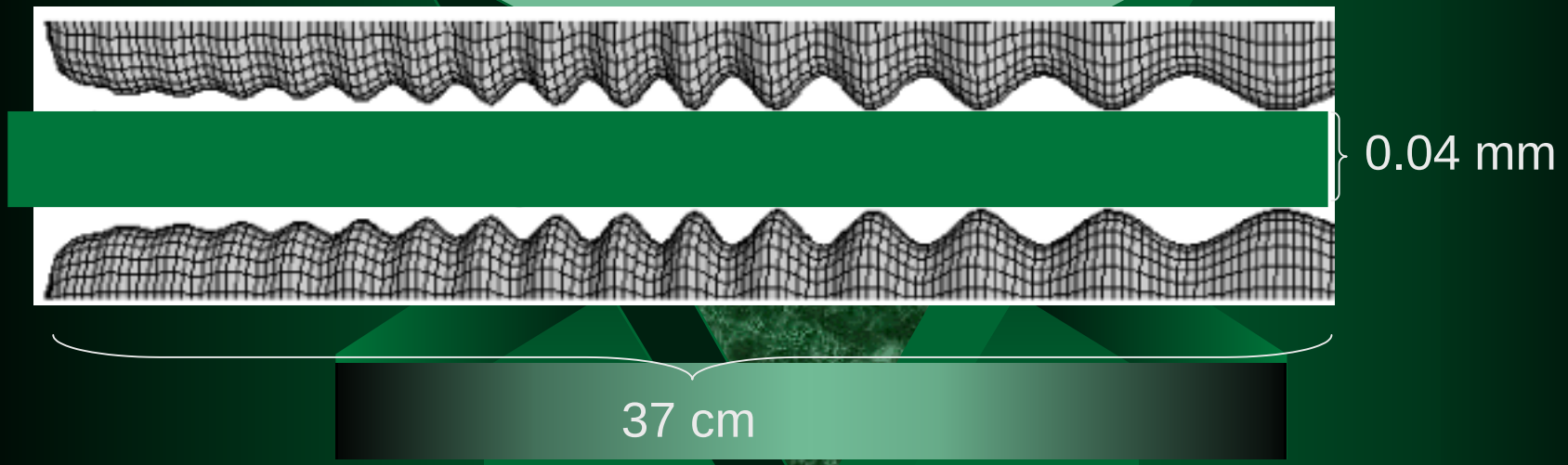

Field-Aligned
Currents
Electrostatic Wave
Turbulance
Region of large
parallel and
perpendicular
electrical fields
and particle
acceleration
Ca+ (LASER)
Upward
Accelerated Ions
RESONANT
REGION
EARTH
ATMOSPHERE

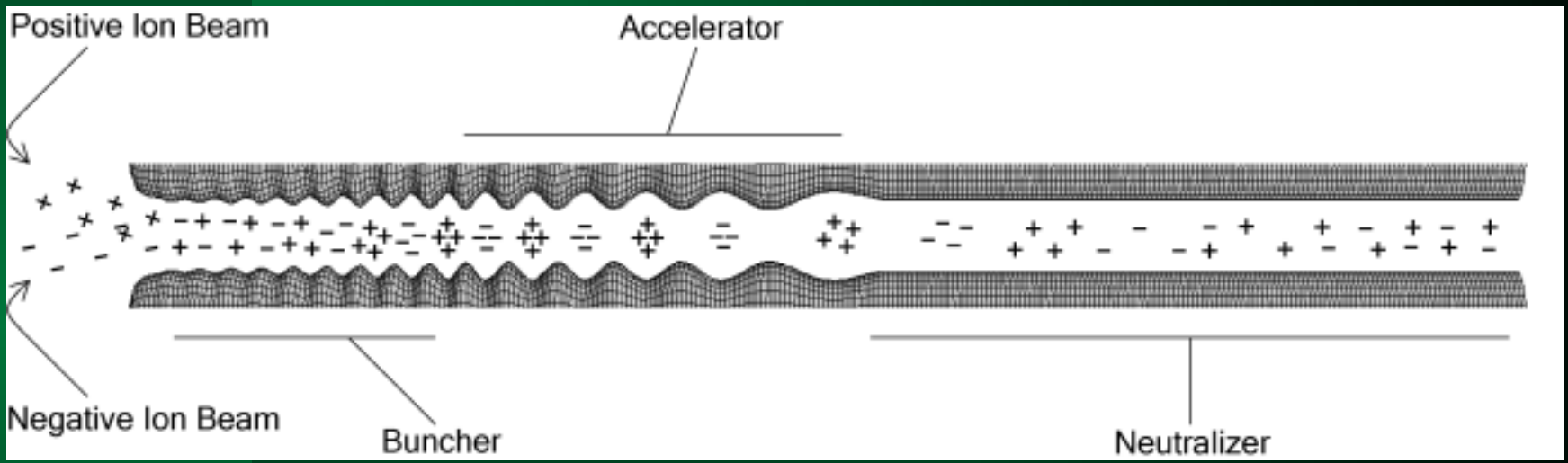
Figure 17

2.5 GHz RFQ



Ion species	D^+
Frequency	2.5 GHz
Length	37 cm
Voltage	6.8 kV
Aperture radius	0.02 mm
Injection energy	20 keV
Final energy	1 MeV
Input beam current	0.32 mA
Output beam current	0.28 mA
Transmission	88%
Beam current density	24.5 A/cm^2

Neutralized Ion Beam Production Concept



Experimental Demonstration of Enhanced Separation of Isotopes in the Presence of a Magnetic Mirror

Medical Applications

PET imaging and Cancer Treatment .

Patent on a new isotope separator.

US005981955A

United States Patent [19]
Wong et al.

[11] **Patent Number: 5,981,955**
[45] **Date of Patent: Nov. 9, 1999**

[54] **ISOTOPE SEPARATION USING A HIGH FIELD SOURCE AND IMPROVED COLLECTORS**

[75] Inventors: **Alfred Y. Wong; Glenn B. Rosenthal**, both of Los Angeles, Calif.

[73] Assignee: **The Regents of the University of California**, Oakland, Calif.

[21] Appl. No.: **08/862,605**

[22] Filed: **May 23, 1997**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/568,583, Dec. 7, 1995, abandoned.

[51] **Int. Cl.**[6] **H01J 37/08**

[52] **U.S. Cl.** ..... **250/423 R**; 250/423 P; 315/111.81

[58] **Field of Search** ..... 250/281, 290, 250/291, 298, 423 P, 423 R; 315/111.81

[56] **References Cited**

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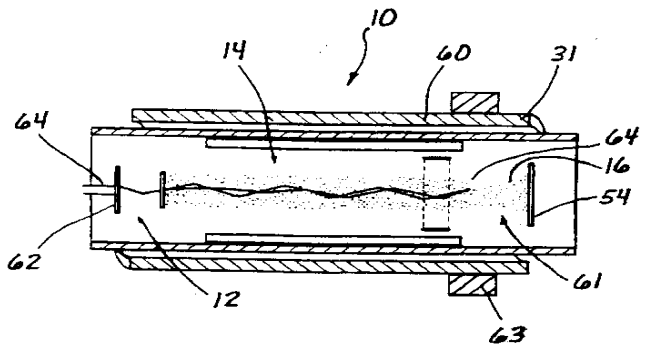
5,506,475	4/1996	Alton	315/111.71
5,681,434	10/1997	Eastlund	250/298
5,707,452	1/1998	Dandl	118/723 W

Primary Examiner—Bruce C. Anderson
Attorney, Agent, or Firm—Daniel L. Dawes

[57] **ABSTRACT**

A plasma chamber for use in isotope enrichment has a microwave feed to the ECRH microwave horns, which feed is led into the plasma chamber behind the sputter plate and perpendicular to the magnetic field for improved microwave waveguide routing and ease of microwave window handling and maintenance. Improved collector design includes a collector assembly placed behind the plasma source comprising a dump plate and flat and shield collector. A ring collector is provided outside the main plasma region in the case where two opposing magnetic mirrors are used and the resonant ions maintained between them. An improved collector assembly can also be provided by disposing the collector assembly in front of the plasma source region and having a double shield-and-slat collector for capturing high energy resonant ions or permitting passage of low energy ions therethrough. Sputter sources for nonconducting materials can be provided by using a thin surface coating applied to a metal backing. The surface coat has a thickness of approximately one ion implantation depth so that the backing plate bleeds the charge from the surface coat. The thin surface coat may continually be replenished within directed jet vapor from a plasma or a doped or filled conductive plasma sputter plate may be employed.

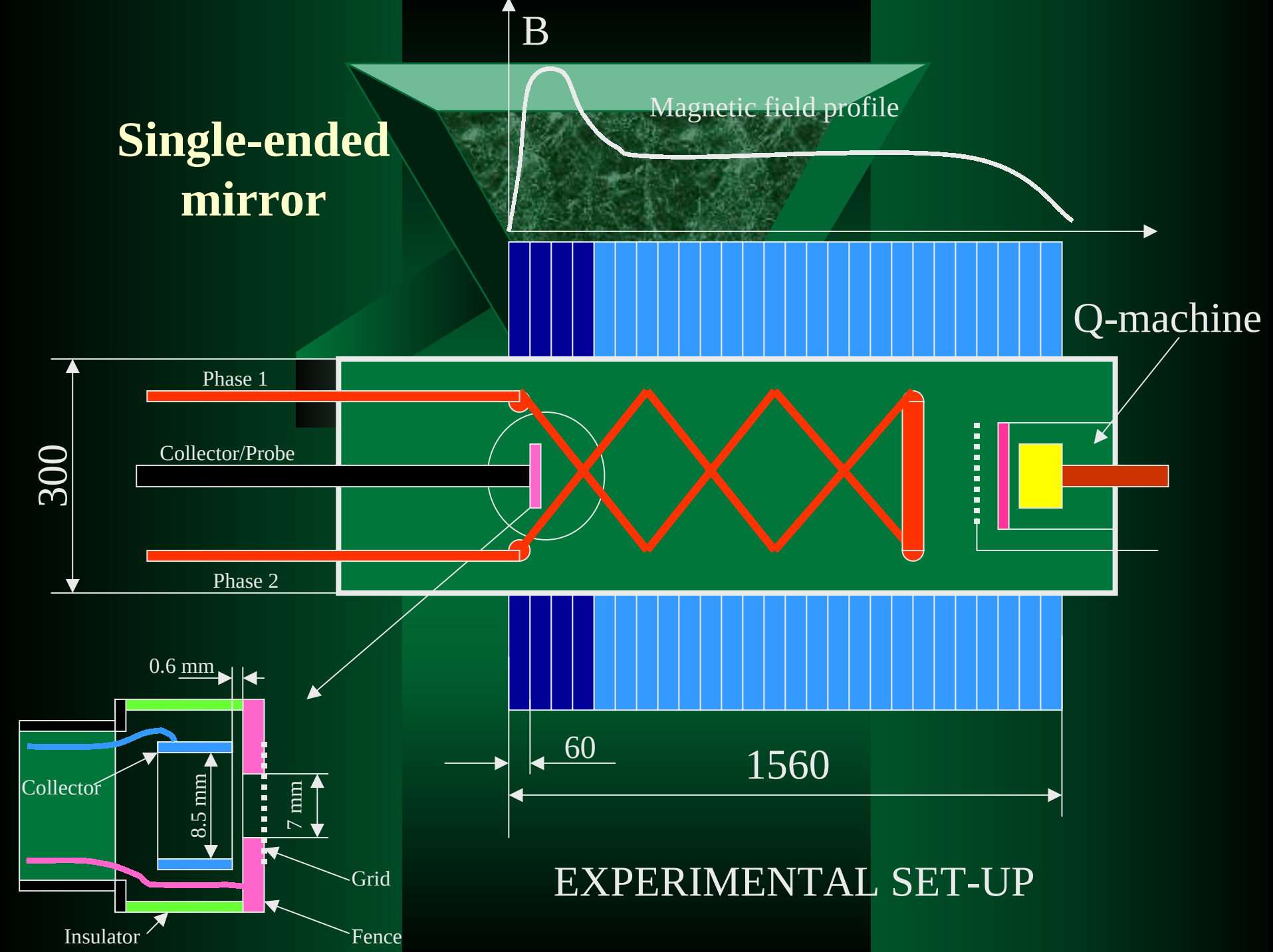
33 Claims, 14 Drawing Sheets



The use of a magnetic mirror increases the separation of isotopic species.

Each selected isotopic species is heated at its ion cyclotron frequency to acquire a perpendicular velocity much larger than its initial parallel energy. Because of the conservation of magnetic moment this energetic species is reflected by the mirror and collected by a cylindrical shell of large area.

The use of mirror greatly reduces the axial length of the device.


B
Magnetic field profile
Single-ended mirror
Q-machine
Phase 1
Collector/Probe
Phase 2
300
0.6 mm
Collector
8.5 mm
7 mm
Grid
Insulator
Fence
60
1560
EXPERIMENTAL SET-UP

Advantages of a mirror device

The reasons higher efficiency are :

1. **The mirror system allows better discrimination between the resonant and non-resonant particles.**
2. **The mirror system allows a higher plasma density to be operated in the device.**
3. **The mirror collectors have a much higher efficiency. This can in some cases approach efficiencies of >90%, compared to the slat collector efficiencies around 33%.**

What Isotopes Do

- Magic Bullet Cancer Treatment

(monoclonal antibodies that carry radioactive isotopes directly to the targeted cancer cells)

- Actinium 227
- Tungsten 188
- Rhenium 188
- Radium 233
- Copper 67
- Rhenium 186
- Iodine 131

Other Cancer/Disease Treatments

- Bone Cancer pain relief
- Heart Disease Diagnosis
- Osteoporosis
- Prostate Cancer
- Brain Cancer
- Rheumatoid Arthritis
- Pancreatic Cancer

- Rhenium 186, Strontium 89
- Phosphorus 33, Samarium 153
- Scandium 47, Tin 117m
- Cadmium 109, Sulfur 35
- Iodine 125
- Palladium 103
- Samarium 145
- Rhenium 188, Dysprosium 165
- Yttrium 90

Universal hand-held charger for any phone or appliance.

A.W. Technologies

Four-Prong Approach

- Theory
- Laboratory Experiment
- Computer Modeling
- Outdoor Experiment

Patents Awarded

1. Electronic Conference Monitoring System, US Patent Number: 3,750,137 Date of Patent: July 31, 1973. Inventors: Alfred Y. Wong, James M. Nuding and Zolton J. Lucky PATENT

2. Electrodeless Plasma Torch Apparatus and Methods for the Dissociation of Hazardous Waste, US Patent Number: 5,288,969. Date of Patent: Feb.22, 1994. Alfred Y. Wong and Andrus Kuthi PATENT

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