

# Snowmass 1999

## Fusion Summer Study

### Daily Detailed Schedule

#### Sunday, July 11, 1999

- 10:00 AM    **Convenors Meeting** – Tent between Pokalodi and Snowmass Inn
- 1 to 6 PM    **Registration** – Snobble Room, Convention Center
- 6:00 PM    **Opening reception** – Anderson Room, Convention Center

#### Monday, July 12, 1999

- 8:30 AM    **Plenary Session** - Roof Top Garden Tent, Convention Center
- 8:30 AM    Mike Mauel (Welcome)
  - 9:00 AM    H. Grunder
  - 9:30 AM    M. Rosenbluth
  - 10:00 AM   F. Wagner
  - 10:30 AM   break
  - 11:00 AM   M. Kikuchi
  - 11:30 AM   R. Conn
  - 12:00 PM   D. Ryutov
  - 12:30 PM   session adjourns (lunch on own)
- 1:30 PM    **Plenary Session** - Roof Top Garden Tent, Convention Center
- 2:00 PM    D. Baldwin
  - 2:30 PM    M. Campbell
  - 3:00 PM    R. Goldston
  - 3:30 PM    break
  - 4:00 PM    T. Taylor (Magnetic Fusion Concepts)
  - 4:15 PM    C. Olson (Inertial Fusion Concepts)
  - 4:30 PM    D. Barnes (Emerging Fusion Concepts)
  - 4:45 PM    A. Kritz (Plasma Science Issues)
  - 5:00 PM    M. Abdou (Technology Issues)
  - 5:15 PM    F. Najmabadi (Energy Issues)
  - 5:30 PM    session adjourns
- 5:45 PM    **Social Hour** - Roof Top Garden Tent, Convention Center

# Tuesday, July 13, 1999 Morning Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Magnetic Fusion Working Group

- 8:30 AM **Magnetic Fusion Working Group**, T. Taylor – Roof Top Garden Tent, Convention Center
- 8:30 AM Plenary - Organization/questions  
9:00 AM S. Kaye - ST talk and discussion  
10:00 AM A. Boozer – Stellarator talk and discussion  
10:45 AM Report to Breakout Groups
- 10:45 AM **MFE Integration**, M. Zarnstorff, R. Fonck - Roof Top Garden, Convention Center  
*International Strategy and Collaborations. W. Nevins and J. Strachan  
Metrics, C. Baker and P. Politzer*
- Transport**, M. Greenwald, J. Sarff – in Tent between Pokalodi and Snowmass Inn  
*ST, P. Efthimion  
Stellarators, A Boozer*
- Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
Chair: R. Nazikian  
*Objectives and Overview for Burning Plasma Sub-Group, H. Berk,  
Research Issues for Reactor-Scale MFE facilities, R. Perkins  
Next Step Options: Physics Issues; Performance Measures, J. Wesley  
Burning Plasma Physics in RC/ITER, R. Parker*
- MHD**, E. Strait, C. Hegna – Mountain Chalet, Breakfast Room  
*ST, S. Sabbagh  
Stellarator, S. Knowlton*
- Steady State**, H. Neilson, E. Synakowski – store front – Incline A  
*ST, M. Peng  
Stellarator, J. Lyon*
- Boundary**, B. Lipschultz, T. Rognlien – Mountain Chalet, Daly Room  
*ST, P. Mioduszewski  
Stellarator, P. Mioduszewski*

#### Inertial Fusion Concepts Working Group

- 8:30 AM **Inertial Fusion Concepts Working Group**, C. Olson –Top of the Village, Tent
- 8:30 AM Plenary session  
9:00 AM Report to Breakout Groups
- 9:00 AM **Inertial Fusion Concepts Subgroups**
- Targets 1A:** Issues, M. Tabak, J. Dahlburg, R. Olson – Top of the Village, Condo # Trails 101
- Drivers 2A:** Drivers, S. Payne, J. Barnard, J. Sethian, R. Spielman, – Top of the Village, Meeting Room
- Power Plants 3A:** Concepts, K. Schultz, R. Peterson, P. Peterson –Top of the Village, Tent

#### Emerging Concepts Working Group

- 8:30 AM **Session EC-2A: FRC and Dipole**, Pyramid Room, Woodrun Place  
Adil Hassam – Chair  
*FRC Presenter, Alan Hoffman  
FRC Reviewer, Dick Majeski*

*FRC Discussion, Panel*  
*Dipole Presenter, Jay Kesner*  
*Dipole Reviewer, Mike Schaeffer*  
*Dipole Discussion, Panel*  
*Break*

10:40 AM **EC Session – 2B: Ion Rings and Electrostatic**, Pyramid Room, Woodrun Place  
George Miley – Chair  
*Ion Ring Presenter, John Greenly*  
*Ion Ring Reviewer, John Finn*  
*Rotating Ion Ring Discussion, Bill Heidbrink*  
*Ion Ring Discussion, Panel*  
*Electrostatic Presenter, Dan Barnes*  
*Electrostatic Reviewer, Bill Nevins*  
*Gridded Electrostatic Discussion, John Nadler*  
*Electrostatic Discussion, Panel*

12:30 PM **Sessions End – Lunch – on own**

**NOTE:**

Coffee Available between 10 and 11 AM at:  
Roof Top Garden, Convention Center  
Top of the Village Tent  
Pyramid Room at Woodrun (will be on deck)

# Tuesday, July 13, 1999 Afternoon Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Energy Issues Working Group Plenary Session

1:30 PM Energy Issues Working Group – Subgroup A – Tent between Pokalodi and Snowmass Inn

*Panel: Energy Market - J. Schmidt, A. Molvik, R. Nebel, R. Miller, B. Chapman, H. Schneider-Muntau, J. Sheffield*

*Panel: Fission competition – W. Manheimer, T. Dolan, W. Stacey, P. Peterson, E. Cheng, C. Wong, D. Steiner*

*Break*

*Panel: Fusion Conventional power plant – D. Meade, R. Moir, R. Bangerter, S. Dean, R. Parker, D. Humphreys, F. Najmabadi, W. Hogan*

Energy Issues Working Group – Subgroup B – Roof Top Garden, Convention Center

*IFE Roadmap, J. Lindl*

*Tokamak – based MFE Roadmap, J. Navratil*

*Spherical Torus based Roadmap, R. Stambaugh*

*Plenary: Generic issues of fusion development – various speakers*

3:35 PM Energy Issues Working Group – Subgroup B

Move to breakout areas

Subgroup B – 1 Roof Top Garden, Convention Center

Subgroup B – 2 Mountain Chalet, Breakfast Meeting Room

Subgroup B – 3 Mountain Chalet, Daly Room

#### Technology Working Groups

1:30 PM **Chamber Subgroup**, Liquid Walls, R. Moir, N. Morley - Top of the Village, Tent

**Plasma Subgroup**, Profile Control, D. Swain, R. Temkin - Top of the Village, Meeting Room

**Chamber Subgroup**, Reliability, M. Tillack, B. Nelson - Top of the Village, Condo # Trails 101

3:45 PM **Plasma Subgroup**, Magnets, J. Schultz, R. Wolley - Top of the Village, Meeting Room

*Introductory Issues, Opportunities, Metrics, J. Schultz*

*Resistive Magnets, P. Heitzenroeder*

*Pulsed Resistive Magnets, R. Woolley*

**Chamber Subgroup**, Solid Walls, M. Ulrickson, R. Mattas - Top of the Village, Condo # Trails 101

**Chamber Subgroup**, Waste Minimization, D. Petti, E. Cheng - Top of the Village, Condo # Trails 304

#### Plasma Science Working Groups

1:30 PM **Turbulence Subgroup Plenary** – Stonebridge, Council Room

**MHD/Beam Subgroup** – Pyramid, Meeting Room

*3D Equilibria, Chair: S. Lund.*

*Equilibria in Tokamak and Stellarators, A. Reiman (R.S. J. Callen)*

*3D Beam Equilibria, R. Davidson (R.S. J. Callen)*

*discussion*

*Experiments, Chair: E. Strait*

*Rayleigh-Taylor Instability Experiments R.Town (R.S. R. Betti)*

*coffee break*

*Experiments on beta limits, G. Navratil (R.S. J. Callen)*

*Ritchmyer-Meshkov instability experiments, G. Dimonte (R.S. M. Rosen)*

*Beam physics experiments, R. Bangerter. (R.S. S. Lund)*

*5-minute presentations*

*discussion*

**Waves Subgroup Plenary**– Chamonix, Meeting Room

*Magnet Fusion, C. Phillips, R. Nazikian, D. Batchelor*

**Boundaries Subgroup**, - Crestwood, Condo # 2315

*Overview of Boundary Physics Issues and Relevance, G. Porter, B. Lipschultz*

4:30 PM           **Turbulence and Wave Subgroups** -Joint Session – Stonebridge, Council Room

5:30 PM           **Sessions End**

NOTE:

Between 3 and 4 PM:

Ice Tea and Lemonade available at Roof Top Garden, Convention Center

Sodas available at Top of the Village, Tent

Coffee at the Pyramid Room at Woodrun (will be on deck) – will be changed

on Wednesday to Lemonade and Ice tea but it will be served at the Terrace

Room in the Crestwood

5:45 PM           **Social Hour**, Roof Top Garden Tent, Convention Center

**Wednesday, July 14, 1999 Morning Sessions**  
**Fusion Summer Study**  
**UPDATED Daily Detailed Schedule**

**Magnetic Fusion Working Group**

- 8:30 AM    **Magnetic Fusion Working Group Plenary**, J. Sarff – Roof Top Garden, Convention Center  
Tokamaks, R. Stambaugh  
Electric tokamak, M. Kissick –  
Report to Breakout Groups
- 10:30 AM    **MFE Integration**, M. Zarnstorff, R. Fonck, S. Luckhardt - Roof Top Garden Tent, Convention Center  
*Spherical Torus, D. Gates, T. Thorson, (R. Fonck)*  
*Stellarator Programs, J. Lyon, D. Anderson, (M. Zarnstorff)*  
**Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
Chair: I. Hutchinson  
*Research Objectives for Cu High-field Experiments and FIRE, D. Meade, H. Neilson,*  
*Critical Physics Issues For Ignition Experiments: Ignitor, L. Sugiyama*  
*Extended High Current Operation with Copper Coil, R. Woolley*  
*Jet upgrade experiment, C. Gormezano*  
**Transport**, M. Greenwald, J. Sarff – in Tent between Pokalodi and Snowmass Inn  
*Tokamaks, C. Greenfield*  
*ET, M. Kissick*  
**MHD**, E. Strait, C. Hegna– Mountain Chalet, Breakfast Room  
*Tokamaks, E. Strait*  
*Electric Tokamak, M. Kissick*  
**Steady State**, H. Neilson, E. Synakowski – store front – Incline A  
*Electric Tokamak, R. Taylor*  
*Tokamak, C. Kessel*  
**Boundary**, B. Lipschultz, T. Rognlien – Mountain Chalet, Daly Room  
*Tokamaks, S. Pitcher*  
*Electric Tokamak, L. Schmitz*

**NOTE:**

Coffee Available between 10 and 11 AM at:  
Roof Top Garden, Convention Center  
Top of the Village Tent  
Pyramid Room at Woodrun (will be on deck)

## Inertial Fusion Concepts Working Group

- 8:30 AM **Inertial Fusion Concepts Working Group**, C. Olson –Top of the Village, Tent  
8:30 AM Plenary session  
9:00 AM Report to Breakout Groups
- 9:00 AM **Inertial Fusion Concepts Subgroup s**  
**Targets 1B:** Facilities , M. Tabak, J. Dahlburg, R. Olson – Top of the Village, Condo # Trails 101  
**Drivers 2B:** Standoff, S. Payne, J. Barnard, J. Sethian, R. Spielman – Top of the Village, Meeting Room  
**Power Plants 3B:** Chambers, Ken Schultz, R. Peterson, P. Peterson – Top of the Village, Tent

## Emerging Concepts Working Group

- 8:30 AM **Emerging Concepts Working Group**, D. Barnes –Woodrun Place, Pyramid Room  
**Session EC-3A: MTF and Flow pinch**  
Alan Hoffman – Chair  
*MTF Presenter, Dick Siemon*  
*MTF Reviewer, TBD*  
*MTF Discussion, Panel*  
*Flow Pinch Presenter, Charles Hartman*  
*Flow Pinch Reviewer, Alan Glasser*  
*Flow Pinch Discussion, Panel*  
Break
- 10:20 AM **Session EC-3B: Mirror, Centrifugal (CCP), and Cross-Section (XSE)**, Pyramid Room, Woodrun Place  
Jay Kesner – Chair  
*Mirror Presenter, Dmitri Ryutov*  
*Mirror Reviewer, TBD*  
*Mirror Discussion, Panel*  
*CCP Presenter, Adil Hassam*  
*CCP Reviewer, Hank Strauss*  
*CCP Discussion, Panel*  
*XSE Presenter, John Perkins*  
*XSE Reviewer, TBD*  
*XSE Discussion, Panel*
- 12:30 PM **Session Ends – Lunch – on own**

**Wednesday, July 14, 1999 Afternoon Sessions**  
**Fusion Summer Study**  
**UPDATED Daily Detailed Schedule**

**Energy Issues Working Group Session**

- 1:30 PM      Energy Issues Working Group – Subgroup A – Tent between Pokalodi and Snowmass Inn  
                 Chairs: J. Greidberg and J. Perkins  
                 *Panel A: K. Schultz, R. Goldston, D. Baldwin, A. Hoffman, M. Abdou, J. Rothenberg, D. Ryutov, R. Miller*  
                 *Panel B: R. Siemon, G. Kulcinski, R. Nebel, G. Logan, R. Speilman, W. Nevins, J. Nadler, G. Miley.*  
                 *Break*  
                 *Panel C: two members from Panel A and Panel B.*  
                 Energy Issues Working Group – Subgroup B, Roof Top Garden, Convention Center

**Technology Working Group**

- 1:30 PM      **Technology Working Groups**  
                 **Chamber Subgroup**, Liquid Walls, R. Moir, N. Morley - Top of the Village, Tent  
                 **Chamber Subgroup**, Testing Facilities, S. Zinkle, M. Billone - Top of the Village,  
                 Condo # Trails 101  
                 **Plasma Subgroup**, IFE Targets, K. Schultz, W. Steckle - Top of the Village,  
                 Condo # Trails 304
- 3:45 PM      **Technology Working Groups**  
                 **Plasma Subgroup**, Profile Control, D. Swain, R. Temkin - Top of the Village, Tent  
                 **Chamber Subgroup**, Solid Walls, M. Ulrickson, R. Mattas - Top of the Village,  
                 Condo # Trails 101  
                 **Chamber Subgroup**, Waste Minimization, D. Petti, E. Cheng - Top of the Village,  
                 Condo # Trails 304

**NOTE - Between 3 and 4 PM:**  
**Ice Tea and Lemonade available at Roof Top Garden, Convention Center**  
**Sodas available at Top of the Village, Tent**  
**Lemonade and Ice tea at the Terrace Room in the Crestwood**

# Plasma Science Working Group

- 1:30 PM      **Turbulence Subgroup** – Stonebridge Inn, Council Room  
Plenary session:  
Discussion leader/recorder: Richard Town, Darin Ernst  
*IFE Overview Jean-Pierre Matte "Transport in ICF Plasmas"*  
*IFE short overview Sigfried Glenzer "Transport Extps. in ICF"*  
*"Issues in turbulence and transport with wider scientific implications", P. Terry*  
*"Opportunities in turbulence simulations", Bill Tang*  
Break and walk (to other meeting rooms)
- MHD/Beam Subgroup** – Crestwood, Terrace Room  
Theory, Chair: R. Betti  
*Stability limits in magnetic fusion devices, J. Freidberg (R.S. J. Manickmam)*  
*Rayleigh-Taylor theory and effects on ICF capsule gain, J. Lindl (R.S. M. Rosen)*  
*Summary of the PPPL MHD workshop, J. Manicham (R.S. H. Straus)*  
*discussion*  
*coffee break*  
Computational, Chair: J. Callen  
*Simulations of MHD instabilities, H. Strauss (R.S. E. Strait)*  
*Simulation of the Rayleigh-Taylor instability in ICF implosions, J. Dahlburg (R.S. R. Betti)*  
*Simulation of MHD instabilities using the NIMROD code, D.Schnack, R. Nebel*  
*(R.S. E. Strait)*  
*Beam transport simulations, S. Lund (R.S. M. Rosen)*  
*10, 5-minute presentations*  
*"Simulations of MHD relaxation phenomena", T. Hayashi, (National Institute for Fusion Sciences)*  
*discussion*
- Wave Subgroups** Plenary – Enclave, Meeting Room  
**Boundaries Subgroup**,– Crestwood, Condo # 2315  
*Atomic Physics and Radiation Transport, J. Albritton, S. Krashinennikov*  
*Plasma Neutral Interactions, A. Mahdavi, P. Mioduczewski*
- 2:30 PM      **Wave Subgroups**  
Breakout Group Discussions  
Group A: Enclave, Meeting Room  
Group B: Chaminox, Meeting Room  
Group C: Top of the Village, Trails Condo # 109
- 4:00 PM      **Turbulence Subgroup**  
Breakout discussion groups. Leader/recorder, room:  
Group A: Paul Terry / Mike Beer, Woodrun Place, Pyramid Room  
Group B: Richard Town / Gary Staebler, Stonebridge Council Room  
Group C: Ed Synakowski / David Newman, Store Front, Incline A
- 4:30 PM      **Plasma Science Working Group**  
**Wave Subgroups** Plenary – Enclave, Meeting Room
- 5:30 PM      **Sessions End**
- 5:30 PM      **Rodeo** (buses depart from transportation center and hotels)

**Thursday, July 15, 1999 Morning Sessions**  
**Fusion Summer Study**  
**UPDATED Daily Detailed Schedule**

**Magnetic Fusion Energy Working Group**

- 8:30 AM     **Magnetic Fusion and Emerging Concepts Working Group Plenary**, Roof Top Garden Tent, Convention Center  
Ron Parker – Chair  
RFP Presenter, Stewart Prager  
RFP Reviewer, Kurt Schoenberg  
RFP Discussion, Panel  
Spheromak Presenter, Bick Hooper  
Spheromak Reveiwer, Masaaki Yamada  
Spheromak Discussion, Panel  
Other Magnetic, Alan Hoffman  
Other Magnetic Discussion, Panel  
Report to Breakout Groups
- 10:45 AM     **MFE Integration**, M. Zarnstorff, R. Fonck, S. Luckhardt - Roof Top Garden Tent, Convention Center  
*Tokamaks, T. Simonen and S. Jardin*  
**Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
Chair: C. Petty  
*Discussion of Plenary talk Magnetic Target Fusion Experiment, D. Petty*  
*Objectives and research required for Design of an ST Burning Plasma Facility, M. Peng*  
*Transport modeling, W. Houlberg*  
*Edge Plasma Physics, D. Mueller*  
**Transport**, M. Greenwald, J. Sarf – in Tent between Pokalodi and Snowmass Inn  
*FRC, L. Steinhauer*  
*RFP, B. Chapman*  
*Spheromak, B. Hooper*  
*LDX, J. Kesner*  
**MHD**, E. Strait, C. Hegna – Mountain Chalet, Breakfast Room  
*RFP, R. Nebel*  
*Spheromak, B. Hooper*  
*FRC, L. Steinhauer*  
**Steady State**, H. Neilson, E. Synakowski – store front – Incline A  
*RFP, S. Prager*  
*EC's, G. Miley*  
**Boundary**, B. Lipschultz, T. Rognlien – Mountain Chalet, Daly Room  
*RFP, D. Den Hartog*  
*Spheromak, D. Ryutov*  
*FRC, L. Steinhauer*

## **Inertial Fusion Concepts Working Group**

- 8:30 AM     **Inertial Fusion Concepts Working Group**, C. Olson –Top of the Village, Tent  
              8:30 AM     Plenary session  
              9:00 AM     Report to Breakout Groups
- 9:00 AM     **Targets 1C:** High yield/high gain, M. Tabak, J. Dahlburg, R. Olson – Top of the Village, Condo # Trails 101  
              **Drivers 2C:** IRE, S. Payne, J. Barnard, J. Sethian, R. Spielman – Top of the Village, Meeting Room  
              **Power Plants 3C:** Target fabrications, K. Schultz, R. Peterson, P. Peterson – Top of the Village, Tent

## **Emerging Concepts Working Group**

- 8:30 AM     **Emerging Concepts Working Group**, Session EC-4A: Joint session with MFWG, Roof Top Garden Tent, Convention Center  
              SEE Magnetic Fusion Working Group agenda
- 10:45 AM    **Emerging Concepts breakout activities**  
              EC Physics Issues SG, Pyramid Room, Woodrun Place  
                  Adil Hassam and Jay Kesner – Chairs  
              EC Reactor Issues SG, Crestwood, Terrace Room  
                  Jim Hammer and Dick Siemon – Chairs  
              EC Next Step Issues SG, Enclave Meeting Room  
                  Alan Hoffman and Bick Hooper – Chairs  
              EC Technical Opportunities, Chamonix, Meeting Room  
                  George Miley and John Slough – Chairs
- 12:30 PM    **Sessions End – Lunch – on own**

### **NOTE:**

Coffee Available between 10 and 11 AM at:  
    Roof Top Garden, Convention Center  
    Top of the Village Tent  
    Pyramid Room at Woodrun (will be on deck)

# Thursday, July 15, 1999 Afternoon Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Energy Issues Working Group

- 1:30 PM      **Energy Issues Working Group- Subgroup A**, Tent between Pokalodi and Snowmass Inn.  
*Presentations by: W. Manheimer, E. Cheng, J. Schmidt, Y. Gohar, R. Parker, C. Bolton, M. Mauel, J. Slough. Discussion to follow each presentation*
- Energy Issues Working Group- Subgroup A - Plenary**, Roof Top Garden Tent, Convention Center  
*Fire, D. Meade*  
*Jet Upgrades, C. Gormezano*  
*ST in a Fusion Development Facility, R. Stambaugh*  
*IRE, R. Bangerter*  
*IRE, H. Powell*  
*IFE Engineering Test Facility, W. Meier*
- 3:35 PM      **Energy Issues Working Group – Subgroup B**  
Move to breakout areas  
Subgroup B1 Roof Top Garden, Convention Center  
Subgroup B2 Mountain Chalet, Breakfast Meeting Room  
Subgroup B3 Mountain Chalet, Daly Room

#### Technology Working Group

- 1:30 PM      **Chamber Subgroup**, Liquid Walls, R. Moir, N. Morley - Top of the Village, Tent  
**Chamber Subgroup**, Material Advances, S. Zinkle, M. Billone - Top of the Village, Meeting Room  
**Plasma Subgroup**, Magnets, J. Schultz, R. Wolley - Top of the Village, Trails 101  
**Plasma Subgroup**, IFE Targets, K. Schultz, W. Steckle - Top of the Village, Trails 304
- 3:45 PM      **Plasma Subgroup**, IFE Profile Control, D. Swain, R. Temkin - Top of the Village, Meeting Room  
**Chamber Subgroup**, Tritium, M. Sawan, S. Willms - Top of the Village, Condo # Trails 101  
**Chamber Subgroup**, Testing Facilities, S. Zinkle, A. Ying - Top of the Village, Condo # Trails 304

#### **NOTE - Between 3 and 4 PM:**

**Ice Tea and Lemonade available at Roof Top Garden, Convention Center**

**Sodas available at Top of the Village, Tent**

**Lemonade and Ice tea at the Terrace Room in the Crestwood**

# Plasma Science Working Group

- 1:30 PM      **Turbulence Subgroup** – Anderson Room, Convention Center  
*Discussion leader/recorder: Richard Town, Glenn Bateman*  
*Fast ignitor theory, Max Tabak*  
*Fast ignitor experiments, Mike Key*  
*Transport in hohlraums/effects of magnetic fields, Jim Hammer*  
*Discussion leader/recorder: Ed Synakowski, Glenn Bateman*  
*Plans and rationale for a basic science facility, George Morales*  
*Search for new plasma turbulence diagnostics, Stuart Zweben*  
*Need for better nonlinear dynamic models of plasma turbulence, and some promising experimental methods towards it, Amiya Sen*  
*Liquid wall effects on transport and plasma behavior (short talk), L. Zhakharov*
- MHD/Beam Subgroup** – Crestwood, Terrace Room  
*Resistive MHD and magnetic field generation, Chair: M. Rosen*  
*Resistive MHD stability, R. LaHaye (RS E. Strait)*  
*Theory and experiments on dynamos and magnetic field generation, S. Prager (RS J. Callen)*  
*Laser induced magnetic fields, Rosen/Hammer (RS S.Lund)*  
*Two fluid effects on MHD instabilities, L. Steinhauer (RS H. Strauss)*  
*The effects of flow on MHD instabilities, J.N. Leboeuf (RS J. Manickam)*  
*Discussion and 5-minute presentations*  
*Dynamical stabilization of the field-reversed-configuration internal tilt mode by rotating magnetic fields: A physical picture, S. Cohen*  
*Spheromak Sustainment and Dynamo, J. Finn*  
*For improved understanding and control of magnetic reconnection M. Yamada*  
*Comments on dynamo effects in fusion plasmas, H. Ji*  
*Coffee break*  
*Discussion on cross cutting issues: (1) Kinetic effects in MHD, beams and laser-plasma instabilities, (2) R-T imposed gain limits in ICF vs beta limits in MFE (3) What physics is missing in the current modeling of MHD/Hydro /Beam instabilities?*
- Wave Subgroup** Plenary – Enclave, Meeting Room  
*Recapitulation, Batchelor chairman*
- Boundaries Subgroup**, – Crestwood Condo # 2315  
*Plasma Materials Interaction, M. Ulrickson*
- 2:00 PM      **Wave Subgroups**  
Breakout Group Discussions  
Group A: Enclave, Meeting Room  
Group B: Chaminox, Meeting Room  
Group C: Top of the Village, Trails Condo # 103
- 3:30 PM      **Turbulence Subgroup**  
Breakout Group Discussions  
Group A: Paul Terry / Mike Beer, Woodrun Place, Pyramid Room  
Group B: Richard Town / Gary Staebler, Anderson Room, Convention Center  
Group C: Ed Synakowski / David Newman, Store Front, Incline A
- 4:30 PM      **Wave Subgroups** Plenary – Enclave, Meeting Room
- 5:30 PM      **Sessions End**
- 5:45 PM      **Social Hour** – Roof Top Garden Tent, Convention Center

# Friday, July 16, 1999 Morning Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Magnetic Fusion Working Group

- 8:30 AM **MFE Integration**, M. Zarnstorff, R. Fonck - Roof Top Garden Tent, Convention Center  
*RFP Program, J. Sarff*  
*Spheromaks, B. Hooper*  
*International Strategy, N. Sauthoff*  
*General discussion of metrics and strategies*
- Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
*Chair: C. Forest*  
*Potential for Upgrades, P. Politzer*  
*Energetic Particle Physics, R. Nazikian*  
*MHD and Wall Stabilization in Burning Plasmas, A. Turnbull*  
*break*  
*Discussion, N. Sauthoff, H. Hutchinson, D. Petty*
- Transport**, M. Greenwald, J. Sarf – in Tent between Pokalodi and Snowmass Inn  
*Crosscutting issues, further discussion of unresolved issues, chits*
- MHD**, E. Strait, C. Hegna – Crestwood, Terrace Room  
*Disruptions, A. Kellman, A. Reiman*  
*Active Mode Control, G. Navratil, D. Gates, R. LaHaye*  
*LDX, J. Kesner*  
*Edge MHD, J. Drake*  
*Open Discussion*
- Steady State**, H. Neilson, E. Synakowski – store front – Incline A  
*Facility Plans, M. Porkolab, P. Politzer, M. Ono, H. Neilson, P. Mioduszewski,*  
*G. Lee, N. Ohyabu*  
*Spheromak, T. Jarboe*
- Boundary**, B. Lipschultz, T. Rognlien – Mountain Chalet, Daly Room  
*Levitated dipole, D. Garnier*  
*Summary, B. Lipschultz, T. Rognlien*

#### Inertial Fusion Concepts Working Group

- 8:30 AM **Inertial Fusion Concepts Working Group Plenary**, C. Olson - Top of the Village, Tent  
*Metrics 4A*  
*Pathways 4B*  
*Develop interim conclusions*

#### Emerging Concepts Working Group

- 8:30 AM **Session EC-5A: Next Step and POP Discussion** – Woodrun Place, Pyramid Room  
Bick Hooper – Chair
- 9:45 AM **Session EC-5B: Technical Opportunities Discussion** – Woodrun Place, Pyramid Room  
George Miley – Chair
- 11:00 AM **Session EC-5C: Other Concepts and Supplementary**

Note: Updated information as of July 21, 1999, 5 PM.

Dan Barnes – Chair  
*Fast Ignitor, R. Stevens*  
*CT Reactor, Linear/Toroidal Concept*  
*SPIRIT, M. Yamada*  
*Propagating Burn Z-pinch, F. Winterberg*

12:30 PM     **Sessions End – Lunch – On own**

**NOTE:**

Coffee Available between 10 and 11 AM at:  
Roof Top Garden, Convention Center  
Top of the Village Tent  
Pyramid Room at Woodrun (will be on deck)

# Friday, July 16, 1999 Afternoon Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Energy Issues Working Group

1:30 PM     **Energy Subgroup A**, F. Najmabadi – Tent between Pokalodi and Snowmass Inn  
*Critical physics issues for burning advanced fuels, B. Nevins*  
*Critical engineering issues for burning advanced fuels, J. Santarius*  
*Physics, technology and environmental issues for advanced fuel R&D, G. Miley*  
*Attractive fusion towards commercial power plants, K. Yoshikawa*  
*Energy transport by synchrotron radiation, M. Mauel*

**Energy Subgroup B**, R. Stambaugh – Roof Top Garden, Convention Center  
ITER-RC, R. Parker  
Steady-state tokamaks, K. Thomassen  
Stellarator, N. Ohyabu  
NIF, LMJ, Japan's ICF program, W. Hogan  
Ignitor, L. Sugiyama

#### Technology Working Groups

1:30 PM     **Chamber Subgroup**, material advances, S. Zinkle, M. Billone - Top of the Village, Tent  
**Chamber Subgroup**, reliability, M. Tillack, B. Nelson - Top of the Village, Condo # Trails 101  
**Plasma Subgroup**, IFE targets, K. Schultz, W. Steckle - Top of the Village, Condo # Trails 304

3:45 PM     **Plasma Subgroup**, Profile Control, D. Swain, R. Temkin - Top of the Village, Tent  
**Plasma Subgroup**, Magnets, J. Schultz, R. Woolley - Top of the Village, Meeting Room  
*Inertial Fusion Magnets, J. Schultz*  
*Magnet Summary, R. Woolley and R. Thome*  
**Chamber Subgroup**, Solid Walls, M. Ulrickson, R. Mattas - Top of the Village, Condo # Trails 101  
**Chamber Subgroup**, Tritium, M. Sawan, S. Willms - Top of the Village, Condo # Trails 304

# Plasma Science Working Group

- 1:30 PM      **Turbulence Group** – Anderson Room, Convention Center  
Joint plenary session with MHD/Beam subgroup  
*Topic: Kinetic-Fluid Macro/Micro simulations.*  
*Opportunities for comprehensive simulations and experimental tests, G. Hammett*  
*Future of plasma computation, merger of kinetic-MHD/turbulence, S. Parker*  
*Merging Fluid/Kinetic Physics, J. Callen*  
*A Distant Mirror, Some Medieval Thoughts on Marginal Stability and Macro/*  
*Micro Interactions, W. Manheimer*  
**MHD/Beam Subgroup** – Anderson Room, Convention Center  
Joint meeting with Turbulence subgroup  
**Wave Subgroups** Plenary – Enclave, Meeting Room  
*Recapitulation, Batchelor chairman*  
**Boundaries Subgroup**, – Crestwood, Condo # 2315  
*Turbulence and Instabilities, R. Cohen*
- 2:30 PM      **Wave Subgroup A** – Enclave, Meeting Room  
*Injected waves (Chan discussion leader, Majeski recorder)*  
**Wave Subgroup B** – Chamonix, Meeting Room  
*Plasma generated waves (Rasmussen discussion leader, Knowlton recorder)*  
**Wave Subgroup C – Top of the Village, Condo # TR 103**  
*IFE (Kruer/Tabak organizers)*
- 3:30 PM      **Turbulence Group** – Anderson Room, Convention Center  
Joint plenary session with Plasma Boundary subgroup  
**Boundaries Subgroup**, – Anderson Room, Convention Center  
Joint meeting with Turbulence Subgroup
- 4:30 PM      **Wave Subgroup** Plenary – Enclave, Meeting Room  
*Discussion of material to be presented from subgroup at the general meeting*  
*summary sessions Monday - drafting of report (Batchelor chairman)*  
**Turbulence Group** – Anderson Room, Convention Center  
*Discussion, prepare for Monday and Friday presentations, begin drafting outline of*  
*white paper, writing assignments (option for further breakout discussion groups)*  
**Boundaries Subgroup**, – Crestwood, Condo # 2315  
*Resumption of discussions*
- 5:30 PM      **Sessions End**
- 5:45 PM      **Reception and SKIT** – Roof Top Garden Tent, Convention Center

**NOTE - Between 3 and 4 PM:**

**Ice Tea and Lemonade available at Roof Top Garden, Convention Center**

**Sodas available at Top of the Village, Tent**

**Lemonade and Ice tea at the Terrace Room in the Crestwood**

**Saturday, July 17, 1999**

- 10 AM        Chairlift ride to top of mountain (cost \$10)
- 12 noon      Lunch on top of mountain at "Dudley's" (restaurant at top of mountain)
- Evening      Activities in Aspen – on own

**Sunday, July 18, 1999**

- All Day      Various activities – sign up sheets for white water rafting, hiking, biking are available in office and at social hours – sign up and join your fellow participants in an activity.

# Monday, July 19, 1999 Plenary Session

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

- 8:30 AM **Morning Status Report Session** – Roof Top Garden Tent, Convention Center
- 8:30 AM Magnetic Fusion Concepts Working Group, T. Taylor
    - Transport, M. Greenwald*
    - MHD Stability, T. Strait*
    - Steady State, H. Neilson*
    - Boundary, B. Lipschultz*
    - Burning Plasma, R. Nazikian*
    - Integration and Performance Measures, M. Zarnstorff*
  - 10:00 AM Inertial Fusion Concepts Working Group, C. Olson
    - Targets, M. Tabak*
    - Drivers and Standoff, S. Payne*
    - Power Plant Concepts, K. Schultz*
    - Metrics and Pathways, W. Meier*
  - 11:00 AM Break
  - 11:30 AM Emerging Fusion Concepts Working Group, D. Barnes
    - Reactors, J. Hammer*
    - Physics, J. Kesner*
    - Next Step, B. Hooper*
    - Technical Opportunities, G. Miley*
  - 12:30 PM session adjourns
- 12:30 PM Lunch on own
- 2:00 PM **Afternoon Status Report Session** – Roof Top Garden Tent, Convention Center
- 2:00 PM Plasma Science Issues Working Group, A. Kritz, J. Cary
    - Turbulence (MFE), G. Hammett*
    - Turbulence (IFE) and waves, J. DeGroot*
    - Waves (MFE), D. Batchelor*
    - MHD/Beams, J. Callen*
    - Boundaries, G. Porter*
  - 3:00 PM Technology Issues Working Group, M. Abdou
    - Chamber Technology, M. Ulrickson*
    - Plasma Technology, R. Callis*
  - 4:00 PM Break
  - 4:30 PM Energy Issues Working Group, F. Najmabadi
    - Report on Energy subgroup A, D. Steiner*
    - Report on Energy subgroup B, R. Stambaugh*
  - 5:30 PM session adjourns
- 5:45 PM **Social Hour** – Roof Top Garden Tent, Convention Center

# Tuesday, July 20, 1999 Morning Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Magnetic Fusion Working Group

- 8:30 AM **Magnetic Fusion Working Group Discussion**, T. Taylor – Roof Top Garden, Convention Center  
*Discussion of major issues, closure*  
*Liquid wall tokamak, L. Zakharov*
- 10:00 AM **MFE Integration and Steady State and Boundary**, M. Zarnstorff, H. Neilson, B. Lipschultz - Roof Top Garden Tent, Convention Center  
*Discussion*  
**Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
*Chair: W. Houlberg*  
*Discussion of agenda for week 2, R. Nazikian*  
*Discussion – Macro-stability, A. Turnbull*  
*Discussion – Confinement issues, D. Ernest*  
*Discussion - Alpha issues, H. Berk*  
*Discussion – Dynamics and control, N. Sauthoff*  
**Transport**, M. Greenwald, J. Sarff – in Tent between Pokalodi and Snowmass Inn  
*discussion of unresolved issues, chits, crosscutting issues, prepare extended outline for report*  
**MHD**, E. Strait, C. Hegna – Erickson Room, Convention Center  
*Open Discussion*
- Later ? **Steady State and Boundary**, H. Neilson – store front – Incline A

#### Emerging Concepts Working Group

- 8:30 AM **Emerging Concepts Working Group Discussion**, D. Barnes – Woodrun Place, Pyramid Room
- 9:30 AM **Break out Group A** – Woodrun Place, Pyramid Room  
**Breakout Group B** – Crestwood, Terrace Room  
**Breakout Group C** – Enclave, Meeting Room  
**Breakout Group D** – Chamonix, Meeting Room

#### Inertial Fusion Concepts Working Group

- 8:30 AM **Inertial Fusion Concepts Working Group Plenary session** – Top of the Village, Tent
- Later? **Targets**, M. Tabak, J. Dahlburg, R. Olson – Top of the Village, Condo # Trails 101  
(11:00 AM) **Drives & Standoff**, S. Payne, J. Barnard, J. Sethian, R. Spielman – Top of the Village, Meeting Room  
**Power plants**, K. Schultz, R. Peterson, P. Peterson – Top of the Village, Tent

**Metrics, W. Meier, J. Perkins – Top of the Village, Condo # Trails 103**

12:30 PM     **Sessions end – Lunch – on own**

**NOTE:**

Coffee Available between 10 and 11 AM at:

Roof Top Garden, Convention Center

Top of the Village Tent

Pyramid Room at Woodrun (will be on deck)

# Tuesday, July 20, 1999 Afternoon Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Energy Issues Working Group

1:30 PM **Energy Issues Working Group Plenary Session**, Tent between Pokalodi and Snowmass Inn  
*Energy Subgroup B, R. Stambaugh*  
*Energy Subgroup A, D. Steiner*

#### Plasma Science Working Group

1:30 PM **Subgroup** Turbulence/Transport, – Woodrun Place, Pyramid Room  
**Subgroup** MHD/Beam – Crestwood, Terrace Room  
**Subgroup** Wave/Particle (injected waves) with MFE Steady State subgroup and RF Technology – Enclave, Meeting Room  
**Subgroup** Boundaries – Chamonix, Meeting Room

3:30 PM **Plasma Science Working Group Plenary** – Roof Top Garden, Convention Center  
*Basic plasma science component of fusion energy sciences,*  
*Moderator: B Heidbrink, Recorder: G. Hammett*  
*Scales of science infrastructure: facilities, diagnostics and software,*  
*Moderator: S. Prager, Recorder: J. Cary*  
*Facilitating comparisons of theory/computation/experiment, Moderator: A. Kritz,*  
*Recorder: G. Porter*

#### Technology Working Group

1:30 PM **Common Meeting**, Contributions, S. Milora, M. Ulrickson – Top of the Village, Tent  
**Common Meeting**, Science Advances, D. Petti, M. Tillack, J. Santarius – Top of the Village, Meeting Room

3:45 PM **Chamber** - Plenary Session, M. Abdou, M. Ulrickson – Top of the Village, Tent  
**Plasma** – Magnetic Summary, D. Swain, R. Woolley – Top of the Village, Meeting Room  
**Plasma** – Inertial Summary, R. Callis, W. Steckle – Top of the Village, Trails 101

5:30 PM **Sessions End**

5:45 PM **Social Hour** – Roof Top Garden Tent, Convention Center

**NOTE - Between 3 and 4 PM:**

**Ice Tea and Lemonade available at Roof Top Garden, Convention Center**

**Sodas available at Top of the Village, Tent**

**Lemonade and Ice tea at the Terrace Room in the Crestwood**

# Wednesday, July 21, 1999 Morning Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Magnetic Fusion Working Group

- 8:30 AM     **MFE Integration**, M. Zarnstorff, R. Fonck - Roof Top Garden Tent, Convention Center  
*Discussion*
- Burning Plasma**, R. Nazikian, W. Houlberg – Stonebridge Inn, Council Room  
*Discussion*
- Transport**, M. Greenwald, J. Sarff – in Tent between Pokalodi and Snowmass Inn  
*Discussion of unresolved issues, chits, crosscutting issues, prepare outline for report*
- MHD**, E. Strait, C. Hegna – Erickson Room, Convention Center  
*Discussion*
- Steady State**, H. Neilson, E. Synakowski – store front – Incline A  
*Discussion*
- Boundary**, B. Lipschultz, T. Rognlien – Mountain Chalet, Daly Room  
*Discussion*

#### Emerging Concepts Working Group

- 8:30 AM     **Break out Group A** – Woodrun Place, Pyramid Room  
**Breakout Group B** – Crestwood, Terrace Room  
**Breakout Group C** – Enclave, Meeting Room  
**Breakout Group D** – Chamonix, Meeting Room
- 11:30 AM    **Emerging Concepts Working Group Discussion** – Woodrun Place, Pyramid Room

#### Inertial Fusion Concepts Working Group

- 8:30 AM     **Inertial Fusion Concepts Working Group** –Top of the Village, Tent  
*Final discussions*  
*Develop Working Group Conclusions*
- 12:30 PM    **Sessions End – Lunch – on own**

#### NOTE:

Coffee Available between 10 and 11 AM at:  
Roof Top Garden, Convention Center  
Top of the Village Tent  
Pyramid Room at Woodrun (will be on deck)

# Wednesday, July 21, 1999 Afternoon Sessions

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### Energy Issues Working Group

- 1:30 PM      **Energy Issues Working Group Plenary Session**, Roof Top Garden, Convention Center  
*Energy Subgroup B, R. Stambaugh*  
*Energy Subgroup A, D. Steiner*

#### Plasma Science Working Group

- 1:30 PM      **Plasma Science Working Group Plenary Session**, Woodrun Place, Pyramid Room
- 3:30 PM      **Subgroup** Turbulence/Transport, – Woodrun Place, Pyramid Room  
**Subgroup** MHD/Beam – Crestwood, Terrace Room  
**Subgroup** Wave/Particle – Enclave, Meeting Room  
**Subgroup** Boundaries – Chamonix, Meeting Room

#### Technology Working Group

- 1:30 PM      **Technology Working Group Chamber** – Plenary, M. Abdou, M. Ulrickson – Top of the Village, Tent  
**Plasma** - Joint Session, S. Milora – Top of the Village, Meeting Room
- 3:45 PM      **Technology Working Group Technology Contributions Sessions** – Top of the Village, Tent
- 5:30 PM      **Sessions End**
- 5:45 PM      **Social Hour** – Roof Top Garden Tent, Convention Center

NOTE - Between 3 and 4 PM:

Ice Tea and Lemonade available at Roof Top Garden, Convention Center

Sodas available at Top of the Village, Tent

Lemonade and Ice tea at the Terrace Room in the Crestwood

#### OTHER MEETINGS

8-10:30 AM – R. Thome, Meeting Room, Top of the Village

6 – 8:30 PM - T. Taylor, Council Room, Stonebridge

# Thursday, July 22, 1999 Plenary Session

## Fusion Summer Study

### UPDATED Daily Detailed Schedule

#### **Open Discussion of Summary Reports – Anderson Room, Convention Center**

- 8:30 AM    Magnetic Fusion Concepts Working Group, T. Taylor  
*presentation (40 minutes)*  
*discussion (50 minutes)*
- 10:00 AM    Inertial Fusion Concepts Working Group, C. Olson  
*presentation (25 minutes)*  
*discussion (35 minutes)*
- 11:00 AM    Break
- 11:30 AM    Emerging Fusion Concepts Working Group, D. Barnes  
*presentation (25 minutes)*  
*discussion (35 minutes)*
- 12:30 PM    session adjourns

12:30 PM **Group Photo** – on ski slope next to the Silvertree hotel

12:45 PM    Lunch – on own

#### **Open Discussion of Summary Reports – Anderson Room, Convention Center**

- 2:00 PM    Plasma Science Issues Working Group, A. Kritz  
*presentation (25 minutes)*  
*discussion (35 minutes)*
- 3:00 PM    Technology Issues Working Group, M. Abdou, S. Milora  
*presentation (25 minutes)*  
*discussion (35 minutes)*
- 4:00 PM    Break
- 4:30 PM    Energy Issues Working Group, F. Najmabadi, R. Stambaugh  
*presentation (25 minutes)*  
*discussion (35 minutes)*
- 5:30 PM    session adjourns

5:45 PM    **Farewell Reception**, Houglan Room (next to Anderson Room),  
Convention Center

**Friday, July 23, 1999 Plenary Session**  
**Fusion Summer Study**  
**UPDATED Daily Detailed Schedule**

**Final Summary Reports – Bedford Room, Convention Center**

- 8:30 AM R. Hawryluk –Opening Remarks
- 8:45 AM Magnetic Fusion Concepts Working Group
- 9:30 AM Inertial Fusion Concepts Working Group
- 10:00 AM Emerging Fusion Concepts Working Group
- 10:30 AM Break
- 11:00 AM Plasma Science Issues Working Group
- 11:30 AM Technology Issues Working Group
- 12:00 AM Energy Issues Working Group
- 12:30 PM G. Logan –Closing Comments
- 12:45 PM Session and Meeting adjourns