

## VII. INTERNATIONAL SYMPOSIUM ON BALL LIGHTNING (ISBL2001)

July 26-29, 2001

University of Missouri  
St. Louis, Missouri

### SECOND ANNOUNCEMENT

#### THE SYMPOSIUM

This symposium, dedicated to the scientific investigation of the phenomenon of ball lightning, is the seventh in a series initiated by Y.-H. Ohtsuki in 1988 in Tokyo (Japan), continued in 1990 in Budapest (Hungary), 1993 in Los Angeles (CA), 1995 in Canterbury (UK), 1997 in Tsugawa (Japan) and 1999 in Antwerp (Netherlands).

Ball Lightning (BL) is the most fascinating and enigmatic atmospheric electricity phenomenon. Although known and described since the antiquity, it is certainly the least understood, and perhaps the most misunderstood, of all atmospheric phenomena. It has thoroughly frustrated the efforts of scientists to study it and to understand its nature. Although about 5% of people have seen ball lightning, few atmospheric electricity scientists have seen it. Although most of them spent countless hours observing lightning flashes, photographing them, measuring their currents and fields, less than 5% of them ever saw BL, and then usually not while doing streak lightning studies in the vicinity of a high point. Indeed, to be more effective, lightning studies are done usually in the vicinity of a high point.

Today we begin to understand why most atmospheric electricity specialists were frustrated and unable to see BL in spite of its usual association with streak lightning. We also begin to understand and explain all the other properties of BL. With theoretical work based on the many observations of BL, on quantum mechanics, electrodynamics and plasma physics, we see the light at the end of the tunnel.

The present Symposium attempts to pursue this unique opportunity offered by modern physics, to approach the end of this tunnel of obscurantism. ISBL 2001 is an attempt to bring together all parties interested in the scientific investigation and future practical applications of the BL phenomenon. This will include participants, contributors and invited speakers from universities, industry, private and governmental laboratories, private and governmental funding agencies, as well as individual observers and analysts. ISBL 2001 will be held at an uncompromising high scientific level. It continues the tradition of the previous symposia with an effort to further increase the scientific level of the invited and contributed papers, without discouraging any sound observational, experimental or theoretical papers, or the attendance of scientifically interested participants.

The Symposium will be held on the University of Missouri-St. Louis Campus with registration on July 25 from 3-9pm.

Lodging will be available for participants at the University of Missouri Honors College on 2800 Normandy Dr, corner with Bellerive Dr., at the site of the former Convent of the Incarnate World Academy. This is close to the location of the Symposium that is also on campus. **The Registration Fee is \$325**, which includes lodging at the Honnors College, dinners and coffee breaks, and a copy of the Proceedings. Breakfast and lunch are available next to the Symposium site at our new Millenium Center, offering a variety of foods and convenient services. Some financial support may become available, but is

uncertain at the present time. Please fill out the appended Registration form, and return to Ms. Susan Fitzsimmons (address is below).

**Convenient transportation** from the airport is available by a fast rail transport called Metrolink, which has a station in the airport. Participants should take the Metrolink to the **UMSL South Station**, which is the fourth stop after leaving the airport main terminal.

For registration and for all questions concerning lodging, meals, transportation, etc., please contact Ms. Susan Fitzsimmons, 209 J.C. Penney, University of Missouri, 8001 Natural Bridge Rd., St. Louis. MO 63121, USA.; (Visa, Master Card and Discover Card accepted by mail or FAX).E-mail:[sfitzsimmons@umsl.edu](mailto:sfitzsimmons@umsl.edu), Phone:314-516-5972, FAX; 314-516-6414. All questions regarding logistics (housing, meals, transportation, etc.) should be addressed to Susan.

For those desiring more comfortable accommodations, a list of hotels is appended. The weather in July is very hot and humid, but there is air conditioning everywhere, including the Honors College Dormitory. A direct MetroLink line connects the station "UMSL South" with the airport; The fare from the airport is \$3, all other fares are \$1.25. UMSL South is the fourth station. The 800 m foot-path from UMSL South Station to the Honors College is shown on an appended map. It passes through the yard of the Catholic Fraternity houses to get on Bellerive Drive. Student guides may be present in the afternoon and early evening of July 25. Taxi from the airport is about \$14 and is recommended if you have luggage.

## SYMPOSIUM TOPICS

BL observations

Analysis of BL observations

Laboratory and free air experiments connected to BL

Scientific models and theories of BL, explaining the BL observations

## LOCAL ORGANIZING COMMITTEE:

Dr. Stanley Singer  
Internatl. Committee on Ball Lightning  
381 South Meredith Ave.  
Pasadena, CA 91106

Prof. Peter H. Handel (Chair)  
Dept. of Physics and Astronomy  
University of Missouri – St. Louis  
St. Louis, MO 63121

Dr. Geert C. Dijkhuis  
ZSC and Convectron N.V.  
Kortenaerlaan 7  
Terneuzen, The Netherlands

Alma L. Chung (Associate Chair)  
Dept. of Physics and Astronomy  
University of Missouri – St. Louis  
St. Louis, MO 63121

Prof. Y.-H. Ohtsuki  
Department of Physics  
Waseda University

Susan Fitzsimmons  
Continuing Education  
University of Missouri – St. Louis

## SCHEDULE – DEADLINES

Symposium Registration should be done preferably by May 12, 2001. After July 1 it's \$350.

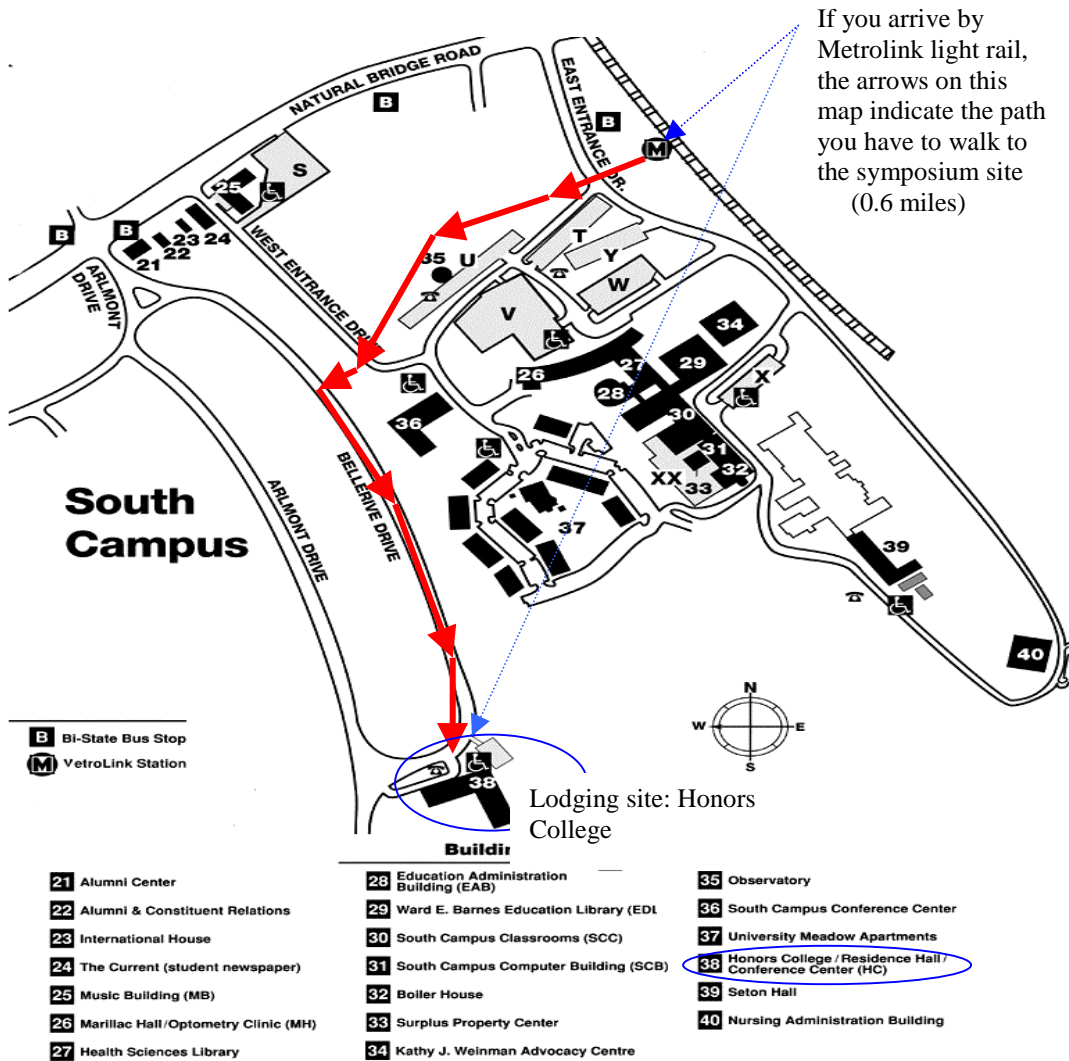
The Abstract deadline was March 5. Post deadline Abstracts are allowed and should be received as early as possible. Post-deadline abstracts will be considered as possible, depending on merit and space available and circumstances. A booklet with accepted abstracts will be available at the Symposium. Please check also our web page [www.umsl.edu/~handel/BLConference.html](http://www.umsl.edu/~handel/BLConference.html). It will try listing accepted abstracts.

## PROCEEDINGS

Participants with accepted papers are asked to bring their camera-ready papers to the Symposium for inclusion in the Proceedings that may have the form of a collection of articles on BL in the form of a book. The inclusion into the Proceedings will be based on a rigorous and exclusive final review of all articles, including invited contributions. The latter are not exempt from the same rigorous scientific

standards. We are against birth control of new ideas. However, to be acceptable as a BL theory paper, a paper needs to clearly relate to the known observed properties of BL. These refer to, but are not limited to: 1) Size, color, duration, absence of buoyancy, horizontal motion segments; 2) Passage through closed windows, about 38% damage probability on the window, occasional microwave heating of closeby conducting objects; 3) Correlation with thunderstorms, tendency toward larger explosive demise energies in free space or enclosures strongly coupled with the outside world; 4) Very low power and demise energy inside well-screened enclosures such as submarines and aircraft; 5) Electrostatic ponderomotive force character of large-energy explosive damages, often without ohmic heating or burns; 6) Frustration of Atmospheric Electricity scientists by BL absence on high peaks used for lightning studies; 7) Difficulty of obtaining BL in the lab at atmospheric pressure; 8) Approach of lower-temperature BL-like atmospheric-pressure discharges by feedback in the laboratory; 9) Connection with earthquakes, UFOs and tornados, etc. All this needs to be reasonably explained, at least qualitatively, or implied in a plausible way, by a worthwhile theory, according to the consensus of atmospheric electricity scientists.

For scientific and technical program problem questions call: Prof. Peter H. Handel, Dept. of Physics and Astronomy, University of Missouri, St. Louis, MO 63121; Tel.: 314-516-5021; Fax: 314-516-6152; E-mail: handel@umsl.edu.



S	TITLE	AFFILIATION	BY
and V.L.	On Ball Lightning Energy from Observations		E
Inv	On the Spheric Radiation	Vienna, Austria	E
and I.B.	Gas Discharge Experiments on Generation of Long-Lived Luminous Objects	Physics Faculty of Moscow State University and Institute for High Temperature of Russian Academy of Science	E
	On Composite Ball Lightning Theory		E
	Direct Observation of Ball Lightning during High Current Electrolyses	Physics Dept., Univ. Lucian Blaga, Sibiu, Romania	E
	Penrose Lattice Plasma Circulation on the Surface of Ball Lightning	ZSC & Convector N.V., Terneuzen, The Netherlands	E
G.E.	Physical Conditions of the BL Ejection caused by Interaction of Electrical Discharge with Metal and Polymer	Scientific Research Inst. of Physics at St. Petersburg State Univ., *Inst. for High Temperature, RAS	E
	Astrophysics, Ball Lightning and Controlled Thermonuclear Fusion – the ABC of Ball Lightning	Dept. of Eng., Univ. of Abertay, Dundee, U.K	E
Inv	On Some Electrical Investigations of Interest to Ball Lightning Experimenters	Dept. of Physics, University of Illinois, Champaign, IL	Mail
	Ball Lightning and Commercial Aircraft	Olka Associates, Brockton, MA	mail
enko, S.V.	Exp. Research of Spectra in After Discharge Water Plasma, from Which Long Living Luminous Objects are Formed	Ministry of Education and Science of Ukraine, Dept. of Physics East-Ukrainian University	E
	Evolution of Hot Metal Vapor	Baltic State Technical University, St. Petersburg, Russia	E
tner	Inv Maser-Soliton BL Theory and the Evidence	St. Louis, MO	
Grace	Connection Between the Maser-Soliton Theory and Other Approaches to BL	St. Louis, MO	
ij*, V. Shostak	Inv Electro-soliton Model of Ball Lightning	Kyiv Polytechnic Inst., Ukraine, *Univ. of Totonto, Canada	E
	The Role of Vector Potential in the Formation of Ball Lightning	U. of Canterbury, Kent, U.K.	F
, H. Tanaka, M.	Inv Numerical and Experimental Study of Electromagnetic Wave Localization for Plasma Fireball	Dept. of Physics, Waseda Univ., *Tokyo Metropolitan College of Aeronautical Eng., Japan	E
	Is a Spatial Stem Ball Lightning?	Fukuoka-City, Japan	E
Inv	A Time-Constant, Space-Invariant Phenomenon	Univ. of Salzburg, *Univ. of Vienna, Austria	E
Inv	Airplane-Associated Ball Lightning	Inst. for Environmental Electromagnetics, Tokyo, Japan	F
v-Kartinov	Observations of Long-Lived Microdust-Assembled skeletons in High-Current Lab. Discharges. Extrapolation to BL	INF RRC "Kurchatov Inst.", Moscow, Russia	E
	Microscopic Ball Lightning	Champaign, IL	E
	Tornadoes and Ball Lightning, Related?	Champaign, IL	E
	Volcanic Ball Lightning	Champaign, IL	E
	Explaining the "Bang" of Ball Lightning	CSIRO Telecommunications and Industrial Physics, Sydney, Australia	E, Airmail
I. Ojovan,	Inv Proposal on Detection and Analysis of Ball Lightning	Moscow, Russia	E
	A Theory of Predicting Earthquake by Micro Ball Lightning	Dept. of Nuclear Engineering, Hokkaido University, Sapporo, Japan	F
	Micro Ball Lightning Observed During Earthquakes Near Kouzu-shima Island	Dept. of Nuclear Engineering, Hokkaido University, Sapporo, Japan	F
a, K. Yasui#, H.	Inv Sonoluminescence Model for Co-Seismic Ball Lightning	Dept. of Physics, Waseda Univ., *Tokyo Metrop. College of Aeron. Eng., #Natl. Industr. Res. Inst. of Nagoya	E
	Analysis of the Energy Content and Stability of Ball Lightning	Inst. for Energy Problems of Chemical Physics, Russian Academy of Sciences, Moscow, Russia	E, Airmail
	Metastable Supercooled Strongly Coupled Plasmas or Rydberg Matter	Moscow Inst. of Physics and Technology	E
Ofuruton*	Fires and Abnormal Electromagnetic Effect Caused by Electromagnetic Wave Localization in Osaka (Japan)	Dept. of Physics, Waseda Univ., *Tokyo Metropolitan College of Aeronautical Eng., Japan	E
Kamagowa,	Inv Co-Seismic BL of 1995 Hanshin-Awaji Earthquake in Japan and 1999 Chi-Chi Earthquake in Taiwan	Dept. of Physics, Waseda Univ., *Tokyo Metropolitan College of Aeronautical Eng., Japan	E
	Geophysical Meteors and Associated Meteorological Conditions	Moscow, Russia	E
	The Hydrocarbonic Plasmoid Fire-Ball	State Research Inst. of Aviation Systems, Moscow, Russia	E
va, L.P.	About the Mechanisms of Plasmoid Structures Formation and the Processes with Their Participation	Scientific Research Inst. of Radio Device Engineering, Moscow, Russia	E
Inv	Discharge in Humid Air, Rotating Plasma and the Problem of Ball Lightning	Tomsk Polytechnic University, Tomsk, Russia	airmail
	Little Black Hole Ball Lightning Model Agrees with Observations	Armor Research, Redwood City, CA	E
	Is the Ball Lightning a Biological Object?	Moscow State University of Physics and Engineering, Moscow, Russia	E
	Ball Lightning Problem and Paradoxes in Theory of Radiation	Vavilov State Optical Inst., All-Russia Scientific Center, St. Petersburg, Russia	Airmail
u, S. Popescu	Self-Organization phenomena in plasma devices with relevance for Ball	Dept. of Plasma Physics, "Al. I. Cuza" University, Iasi, Romania	E

	Lightning Appearance	Athenex, Pasadena, CA	E
Inv	Directions in Ball Lightning Research Following the Sixth International Symposium on Ball Lightning		
	Could Existing Physical Knowledge Give Us the Key to the Ball Lightning Problem?	Heat Phys. Dept., Plasma Lab, Moscow Power Eng. Inst. (Techn. Univ.), Moscow, Russia	E
	Ball Lightning Explained in Terms of a Toroidal Electromagnetic Field	Waterlooville, UK	E
	Electric Manifestation of Ball Lightning	Inst. of Terrestrial Magnetism, Ionosphere, and Radio Wave Propagation, RAS, Troitsk, Moscow Region	E
	Observed Characteristics of the Ball Lightning Depending on Various Observation Circumstances	Inst. of Terrestrial Magnetism, Ionosphere, and Radio Wave Propagation, RAS, Troitsk, Moscow Region	E
Inv	A Review of Recent Ball lightning Theories and Experiments	Royal Meteorological Society, Berkshire, UK	E
	Reproducing Ball Lightning by Electric Discharge	B.P. Konstantinov Nuclear Physics Inst., Gatchina, Leningrad Distr., Russia	E
Inv	Anderson Localization Hypothesis of BL: A 3-D Simulation of Localization and Enhancement of Elmg. Waves	Dept. of Electr. & Comp. Eng. Of Gifu University, Yanagido, Japan	E
	Can We Speed up Ball Lightning Research?	Condensation Physics, Huntingtown, MD	E
, V.I Liksonov,	Luminous Objects in Experiments with Exploding Foils	REKOM, RSC Kurchatov Inst.; *Inst. for High Temperature, RAS	E
	Receipt of Fireball Based on a Vortex Ring of Combustibles	Ryazan, Russia	E

**HONOR:**

ER

**REGISTRATION FORM (REVISED)**  
**VII. International Symposium on Ball Lightning (ISBL2001)**  
**July 26-29, 2001**

**Please print:**

Name: \_\_\_\_\_ FAX: \_\_\_\_\_  
Address: \_\_\_\_\_ EMAIL: \_\_\_\_\_  
\_\_\_\_\_  
PHONE: \_\_\_\_\_

\_\_\_\_\_ I will attend. \_\_\_\_\_ I am planning to present a paper at the symposium  
Title of paper: \_\_\_\_\_

\$30.00 \_\_\_\_\_ Enclosed is a conference registration fee payment of \$30.00  
(includes coffee or soft drinks for all coffee breaks – mornings and afternoons)

\$18.00 \_\_\_\_\_ I plan to attend the visit to the Casino at the Riverfront on Thursday, July 26.  
Enclosed is \$18 for this excursion. (includes transportation to casino, buffet dinner and free  
boarding for casino boat)

\$25.00 \_\_\_\_\_ I plan to attend the Banquet on Saturday night, July 28.  
Enclosed is \$25 for the banquet. (Includes dinner and gratuity)

\$20.00 \_\_\_\_\_ I want to sign up for dinner on Sunday night, July 29. Cost: \$20

\$150.00 \_\_\_\_\_ Campus Housing at UMSL Honors College (5 nights – Wed. through Sun.) \$150

**Arrival Date at UMSL Honors College Lodging** \_\_\_\_\_ **Time** \_\_\_\_\_  
**Departure Date from UMSL Honors College** \_\_\_\_\_ **Time** \_\_\_\_\_

I want to stay \_\_\_\_\_ additional nights at the Honors College (Cost \$30 per night)  
Dates: \_\_\_\_\_

\$ \_\_\_\_\_ My total bill that I agree to be charged or to pay. (\$243.00 if you like to include all events).

Note for those who registered already: If you have already sent in your registration fee, you will only be charged for the items above (\$243). In case you don't want to join all events mentioned above, please let us know as soon as possible.

**Please make checks payable to: University of Missouri-St. Louis**

Use check or credit card to pay. **Credit card numbers will only be accepted via mail, fax or phone:**

**Do not e-mail credit card numbers.**

Credit card numbers must be faxed to 314-516-6414.

Phone number: 314-516-5974 (Nichelle Hardy)

Phone number: 314-516-5972 (Susan Fitzsimmons)

Circle Credit Card type: **VISA    Mastercard    Discover    (no other cards accepted)**

**Credit card number** \_\_\_\_\_

**Expiration Date:** \_\_\_\_\_ **Signature:** \_\_\_\_\_

\_\_\_\_\_ I will pay for registration, and for the activities signed up above, after arrival at the Symposium.

\_\_\_\_\_ I would like information on the proceedings when available. Note: Above fees do not include the cost of the proceedings.

Return as soon as possible to: **Ms. Susan Fitzsimmons** (E-mail: [sfitzsimmons@umsl.edu](mailto:sfitzsimmons@umsl.edu)),

**University of Missouri**  
**8001 Natural Bridge Rd**  
**218 J.C. Penney Building**  
**St. Louis, MO 63121-4499, USA.**

### Financial Support Request Form

US immigration laws allow reimbursement for only certain types of visa. Proper types of VISA are types J1,H-1B, B1 and WB. If you enter the US on a B2 or WT(tourist) VISA you may or may not receive any type of payment from the university. If your consulate grants visas of type B1/B2 or WB/WT, to avoid any complication, upon entry, please make sure that your immigration form I-94 is stamped either B1 or WB.

PLEASE NOTE: We will contact you if we need more information, especially regarding your immigration status.

<b>Name:</b>		
<b>Occupation:</b>	<b>Institution/Organization:</b>	
<b>Social Security # if any:</b>		
<b>Address:</b>		
<b>City &amp; State:</b>	<b>Zip:</b>	<b>Country:</b>
<b>Email:</b>	<b>Home Phone:</b>	
<b>Total Travel Miles (if traveling by car or bus):</b>		
<b>Airline:</b>		
<b>Ticket Cost (in US\$):</b>		
<b>Lodging: Honors College                      or Hotel Name:</b>		
<b>(No reimbursement for hotel accommodations)</b>		
<b>Who is partially or fully paying for your expenses?</b>		
<i>( Please list all sources and amounts expected)</i>		
<b>Please indicate the TOTAL amount of money (in US\$) that you would have to pay from your own pocket without our support:</b>		
<b>Are you a US citizen? (Yes/No)</b>		
<b>If not, are you a permanent resident? (Yes/No)</b>		
<b>If not, what is your current immigration status?</b>		
<b>If you don't have an immigration status, what status do you plan to visit the US with?</b>		
<b>If you are in H-1B or J-1 or F-1 status,</b>		
<b>what is the name of your sponsoring institution?</b>		

\* To be able to issue a reimbursement check, you will need to provide us with copies of (1) Passport(frontpage), (2) US Visa, (3)I-94 form(issued at the US Border), (4) IAP-66(if you are on J1 Visa). You will also need your original

flight ticket. If you are on J-1, or F-1 status, you need a written letter from your sponsoring institution, addressed to Joachim Stoeckler, granting permission for travel reimbursement.

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_



### Hotels Near UM-St. Louis

These hotels have been selected for their close proximity (10- to 15-minute drive) to the UM-St. Louis campus. Complimentary airport shuttle service may be provided as noted and may have limited hours of service. Please make your arrangements directly with the hotel. Be sure to mention your participation in a UM-St. Louis course to receive any available discounted rates. (The toll-free numbers listed are for national reservations and may not honor special discounts.)

### Modest Hotels (\$35 - \$60 range)

#### **1. Days Inn at the Airpor**

4545 Woodson Road, St. Louis, MO 63134  
314/423-6770; 800/325-2525

Notes: UMSL preferred rate, complimentary airport shuttle and continental breakfast, cable, outdoor pool, restaurants nearby

#### **2. Howard Johnson's St. Louis Airport Hotel**

4530 N. Lindbergh, Bridgeton, MO 63044  
314/731-3800; 800/446-4656

Notes: UMSL special rates, complimentary airport shuttle and continental breakfast, two restaurants /lounge, cable, outdoor pool, nonsmoking rooms

#### **3. Red Roof Inn Florissant**

307 Dunn Road (I-170/270 at Graham Road), St. Louis, MO  
314/831-7900; 800/THE ROOF (800/843-7663)

Notes: No shuttle service available, complimentary coffee/newspaper, free local calls

#### **4. Red Roof Inn Bridgeton**

I-270 & St. Charles Rock Road, St. Louis, MO  
314/291-3350; 800/THE ROOF (800/843-7663)

Notes: No shuttle service, complimentary coffee/newspaper, cable

### Moderate Hotels (\$65 - \$80 range)

#### **5. St. Louis Best Western Airport Inn**

10232 Natural Bridge Road, St. Louis, MO 63134  
314/427-5955; 800/528-1234

Notes: UMSL special rate, complimentary airport shuttle/continental breakfast, cable, outdoor pool, adjacent restaurant

#### **6. Drury Inn - Airport**

I-70 & Lambert International Airport, St. Louis, MO 63134  
314/423-7700; 800/378-7946

Notes: UMSL special rate, complimentary airport shuttle/ continental breakfast, cable, free local calls, indoor pool, hot tub

#### **7. Hampton Inn Airport**

I-70 & Lambert International Airport, St. Louis, MO 63074  
314/427-3400; 800/HAMPTON (800/426-7866)

Notes: UMSL special rate, complimentary airport shuttle/continental breakfast, cable, free local calls, outdoor pool

#### **8. Holiday Inn Airport/North**

4545 N. Lindbergh, St. Louis, MO 63044  
314/731-2100; 800/785-6202

Notes: UMSL special rate, complimentary airport shuttle, restaurant/lounge, cable, data port, Holidome indoor recreation center

**9. Holiday Inn Airport - Oakland Park**

4505 Woodson Road, St. Louis, MO 63134

314/427-4700; 800/426-4700 (outside Missouri); 800/HOLIDAY (national reservations)

Notes: UMSL special rate, complimentary airport shuttle/coffee/newspaper, restaurant/lounge, exercise facility, outdoor pool

**Deluxe Hotels (\$80+)**

**10.Embassy Suites at St. Louis Airport**

11237 Lone Eagle Drive, Bridgeton, MO 63044

314/739-8929; 800/EMBASSY (800/362-2779)

Notes: Complimentary airport shuttle and breakfast/newspaper, restaurant/lounge, two-room suites with galley kitchen, cable, indoor pool, fitness center, complimentary cocktails

**11.Henry VIII Hotel and Conference Center**

4690 N. Lindbergh, St. Louis, MO 63044

314/731-3040; 800/392-1660 in Missouri; 800/325-1588 outside Missouri

Notes: Complimentary airport shuttle, two restaurants/lounge; fitness facilities include tennis, jogging trail, equipment, indoor/outdoor pools

**12. Radisson Hotel St. Louis Airport**

11228 Lone Eagle Drive (I-70 & Lindbergh South), St. Louis, MO 63044

314/291-6700; 800/333-3333

Notes: Complimentary airport shuttle, restaurant/lounge, exercise facility, indoor pool/whirlpool

**13.Renaissance St. Louis Hotel - Airport**

9801 Natural Bridge Road, St. Louis, MO 63134

314/429-1100; 800/HOTELS 1 (800/468-3571)

Notes: AAA Four Diamond Award Hotel, complimentary airport shuttle and in-room coffee/newspaper, restaurant/lounge, cable, indoor/outdoor pools, health club, concierge

**14. St. Louis Airport Hilton**

10330 Natural Bridge Road, St. Louis, MO 63134

314/426-5500; 800/345-5500

Notes: Complimentary airport shuttle/newspaper, restaurant/lounge, in-room coffee makers, data port, voice mail, fitness area, indoor pool, nonsmoking/handicap rooms

**15. St. Louis Airport Marriott**

1-70 & Lambert International Airport, St. Louis, MO 63134

314/253-5232; 800/228-9290

Notes: Complimentary airport shuttle, two restaurants/lounge, cable, data port, voice mail, health club, indoor/outdoor pools, tennis courts.