**tatus of RILIS**

Presented by V.Fedosseev to ISCC Geneva, 30 September 2003

**Involvement of RILIS in the ISOLDE program**.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** | **2001** | **2002** | **2003** |
| **Laser setup operation time, hours** | 490 | 348 | 486 | 1679 | 1267 | 547 | 1203 | 1429 | 1787 | 1850 |
| **Ionized elements** | Ag  Ni | Ag | Ag  Mn | Be  Cd  Cu  Ni  Mn  Zn | Ag  Be  Cd  Cu  Ni  Mg  Mn  Sn | Ag  Be  Cu  Mn  Pb  Sn | Ag  Al  Be  Bi  Ca  Co  Cu  Ga  Mn  Pb  Sn  Tl | Ag  Be  Bi  Cd  Cu  Ga  In  Mg  Pb  Tb  Tl  Y  Yb  Zn | Ag  Be  Bi  Cd  Cu  Ga  Mg  Mn  Pb  Sn  Tl  Zn | Ag  Be  Bi  Cu  Ga  Ni  Mg  Mn  Pb  Sb  Sc  Y  Zn |
| **Experiments** | IS333 IS335 | IS333 IS335 IS345 | IS335 IS359 | IS304 IS333 IS335 IS345 IS353 IS358 IS359 | IS333 IS335 IS345 IS358 IS359 IS365 IS366 | IS335 IS345 IS358 IS359 IS364 IS368 IS369 | IS333 IS335 IS345 IS358 IS359 IS365 IS368 IS369 IS374 IS378 IS387 | IS333 IS335 IS363 IS368 IS369 IS373 IS374 IS387 IS393 IS403 IS406 I33 | IS302 IS333 IS343 IS345 IS359 IS360 IS368 IS369 IS378 IS381 IS387 IS390 IS391 IS393 IS396 IS401 IS403 IS404 IS406 IS410 | IS335 IS348  IS359 IS368 IS369  IS375 IS387 IS396 IS401  IS402 IS403 IS406  IS407 IS410  IS412  IS413 |

**MANPOWER (2003)**

Operation

1. V. Fedosseev, AB-ATB/LP – 57 % of contractual time, including development;
2. B. Marsh, Ph.D. student, University of Manchester – 50 % of time, including development;
3. D. Fedorov or A. Ionan, PNPI (Gatchina) – approximately 4 months
4. E. Tengborn, tech. student, Chalmers University – 6 months (2003 only)

Development

1. G. Suberlucq, AB-ATB/LP – 20 % of time
2. E. Chevallay, AB-ATB/LP – 30 % of time
3. D. Grancharova, CERN technical student (until 1.03.2004)

**RILIS in the ISOLDE Consolidation Project**

Allocated: 220 kCHF (Collaboration budget)

Committed: 114 kCHF + 21 kCHF from CERN budget

* Laser hut extension – done, 2001
* Remote controlled beam tuning – done, 2002
* Laser beam diagnostics – in progress, 2003

To spend: ≈ 10 kCHF

* CVL beam guidance (screening of the laser beams) – 2004

To spend: ≈ 50 kCHF

* Automated beam positioning – 2004
* Automated laser power monitoring – 2004

To spend: ≈ 45 kCHF

**Upgrade of Lasers**

The present status of the laser system **does not provide** the reliable RILIS operation. The following possibilities of upgrading RILIS lasers have been considered:

1. Improvements in the existing CVL - dye laser system.

Following actions are taken recently:

* New CVL oscillator with new power supply – ordered (39 kCHF)
* New DC power supplies for CVL amplifiers – ordered (39 kCHF)

57 kCHF from CERN and 21 kCHF from ISOLDE Collaboration

**– The equipment will be installed during the shutdown 2003**.

1. Replacement of the old CVL by new CVL available on the market.

* Offer from “Oxford Lasers ltd.” - 246 k₤ (app. 550 kCHF)
  + Longer pulse – less efficiency for UV light generation.
  + More space is required for laser setup.
  + Too big investment for a temporal solution

– T**his way is considered as ineffective**

1. Replacement of the CVL by solid-state lasers (SSL).

Results of the laser market survey:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Manufacturer** | **Model** | **Power/unit, W** | **Price,**  **kCHF** | **Price for 80 W system** |
| Lambda Physics AG | PowerGator PG532-15 | 14 | 243 | 6 units = 1460 |
| Lightwave Electronics Corp. | Q201-SM-E | 15 | 72 | 6 units = 556 |
| Photonics Industries International, Inc. | DS20H-532 | 40 |  | 2 units = 560 |

* Some work on adapting the dye lasers to SSL pumping is required
* The investment will not be lost at the next step of upgrading

1. Creating a new fully solid-state laser system**.**

Problems:

* + The need for very high powers compared to the state of the art for these types of laser.
  + The need to generate high powers in the UV which will require frequency multiplication from the IR.
  + The reliability of such a system would be questionable given the powers required and the number of state of the art units used.
  + The use of lasers of this type would probably require the ionization routes to be re-optimized as it is unlikely that the attractive wavelengths for the all solid state system would correspond to those currently obtained from the dye system.

**Planning**

1. **Short term** **(2003-2005)** – improvement of the actual setup in order to provide as far as possible the conditions for reliable RILIS operation during.
2. **Middle term** **(2005-2006) –**

* Implementation of a solid state laser as a complimentary source for pumping dye lasers and as a source of ionizing beam for transitions to continuum
* Replacement of all CVL by SSL– app. 500 kCHF.

**Funds to be accumulated during 2003-2004**

1. **Long term (2006-2008) –** replacementof the dye lasers by the new wavelength-tunable solid state laser system which could bedelivered as a result of the R&D in the frame of JRA “LASER” of EURONS

**Pumping lasers would not be changed**