2p Parts List - DF Albeanu - June 2009

The list does not include the custom made adapters for holding onto the rail the scanner, the "body" of the microscope and the objective.

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1) 1 x Counter (Comparator) - PRL-350TTL ($575)

 http://www.pulseresearchlab.com/products/logic\_trans/350ecl\_ttl/350ecl\_ttl.htm

2) 1 x Pulse Amplifier - Mini-Circuits ZPUL-30P - ($300 ?)

www.minicircuits.com/pdfs/ZPUL-30P.pdf

3) 1 x Power supply from Agilent - the same that we use for the PMTs in our 2p microscopes

Metric Test Tel: 1.800.417.4370

Agilent Power supply E3620A NEED 1 1X $600

http://www.metrictest.com/product\_info.jsp?mfgmdl=HP%20E3620A(N)&gclid=CNyr2Z2KzowCFRevgAodDB5rqA

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Hamamatsu

Telephone: 908-231-0960

Fax: 908-231-1218

1) R3896 large PMT NEED 1 1 X $860

2) C6270 socket NEED 2 2 X $267

3) R9110 PMT NEED 1 1 X $946

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 Total $2,340

OPTIONAL

4A) H7422-40 (GaAsP) photomultiplier tube modified - see below

Has 3 X better quantum efficiency and costs $3000, takes up to 3 months to ship.

You can find the quote attached separately. I would use the first two PMTs to begin with and if want to image deep the H7422. One drawback is that being more sensitive to light is easily damaged.

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Metric Test

Tel: 1.800.417.4370

Agilent Power supply E3620A NEED 1 1X $600

http://www.metrictest.com/product\_info.jsp?mfgmdl=HP%20E3620A(N)&gclid=CNyr2Z2KzowCFRevgAodDB5rqA

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 Total $600

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Conoptics

Tel: 800 748 3349

Pockels Cell Attenuator and Driver Model 302RM for Two-Photon Applications

(Pockel cell AND driver) NEED 1 1X$7000

http://www.conoptics.com/Laser\_Modulation.htm

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 Total $ 7000

If you don’t want to have extremely fast control over the laser beam (microsecond) and are satisfied with tens of msec, the laser attenuation can also be implemented cheaper with a half lambda plate, a prism and a rotational stage – would cost ~ $3000 or less.

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OPTIONAL

FIND-R-SCOPE

Tel: 847-358-2500

Fax: 847-358-2533

http://www.findrscope.com/

FIND-R-SCOPE Laser Application Kit Model 85268A NEED 1 1X $1700

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OPTIONAL

Rockwell Laser Industries

Tel: 1-800-945-2737

Protection Glasses E-G-LS645 NEED 1 1 X $500

http://www.rli.com/products/eyewear.asp?Heading=Laser\_Eyewear\_and\_Goggles&Item=E%2DG%2DLS645

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Thorlabs

1) Beam Dump LB1 NEED 2 2 X $45

3) Adjustable Base BA2T2 NEED 4 4 X $20

4) Construction Rail 1m XT95-1000 NEED1 1 X $150

5) XT Base Plate XT95P3 NEED 1 1 X $30

6) Rail Plate XT95P1 NEED 5 5 X $40

7) Cage System Cube with 6mm clearance LC6W NEED 3 3 X $120

8) Blank Cover Plate LB1C NEED 3 3 X $30

9) SM2 Series End Cap SM2CP2 NEED 3 3 X $30

10) Rotatable Kinematic Platform LB4C NEED 3 3 X $120

11) Cage Cube Optic Mount LB5C NEED 2 2 X $50

12) C4W - 30mm Cage System Cube C4W NEED 1 1 X $55

13) Cage Cube Optic Mount For B3C B5C NEED 1 1 X $30

14) B4C Rotatable Kinematic Platform B4C NEED 1 1 X $90

15) B1C Blank Cover Plate B1C NEED 1 1 X $15

16) SM1CP2 End Cap Internal Threads SM1CP2 NEED 1 1 X $20

17) 2” lens mounts LMR2 NEED 3 3 X $25

18) 30 mm lens mount LMR3 NEED 1 1 X $40

19) SM1 Lens Tube 1" SM1L10 NEED 3 3 X $15

20) SM1 Lens Tube 2" SM1L20 NEED 2 2 X $20

21) SM2 Lens Tube SM2L30 NEED 2 2 X $35

22) SM2 Coupler SM2T2 NEED 4 4 x $30

23) SM1 to SM1 Coupler SM1T2 NEED 2 2 X $20

24) SM2 to Sm1 Adapter SM2A6 NEED 2 2 X $20

25) SM2 to SM1 Adapter SM1A2 NEED 2 2 X $25

26) SM2 Series Adjustable Focus SM2V10 NEED 2 2X $60

27) SM1 Series Adustable Focus SM1V10 NEED 2 2 X $20

28) SM1 to C-mount Adapter SM1A10 NEED 1 1 X $20

29) EXternal C-mount to SM1 SM1A9 NEED 1 1 X $20

30) External SM1 Internal RMS SM1A3 NEED 1 1 X $20

31) 45 degree mirror holder MA-45-2 NEED 1 1 X $25

32) Rail for mirrors XT66DP-500 NEED 1 1 X $20

33) Corner XT66RA2 NEED 1 1 X $30

34) Double Dovetail Clamp XT66C2 NEED 2 2 X $20

35) Clamping platform XT66C4 NEED 2 2 X $25

36) Mounting Dovetail XT66D2-40 NEED 2 2 X $10

37) Double Dovetail Rotation Clamps XT66RD NEED 1 1 X $100

38) Scan lens AC300-050-B NEED 1 1 X $100

39) Tube Lens AC508-300-B NEED 2 2 X $150

40) Collection Lens 1 LA1384-A NEED 1 1 X $40

41) Collection Lens 2 AL4532-A NEED 2 2 X $380

42) Diffuser DG10-1500 NEED 1 1 X $10

43) LED Focusing Lens LA-1805-A NEED 1 1 X $30

44) Telescope Lens 1 LA1399-B NEED 1 1 X $30

45) Telescope Lens 2 LA1145-B NEED 1 1 X $30

46) Mounting Post P2 NEED 2 2 X $25

47) Mounting Post P6 NEED 1 1 X $47

48) Clamp CL5 NEED 4 4 X $5

49) Mounting Post Bracket C1505 NEED 1 1 X $90

50) Optical Rail RLA1200 NEED 1 1 X $70

51) Rail Carrier RC1 NEED 2 2 X $25

52) Lens Tube SM2L20 NEED 2 2 X $30

53) Lens Tube SM2L10 NEED 4 4 X $30

54) Lens Tube SM2L05 NEED 2 2 X $25

55) CCD camera lens  **[AC254-150-A](http://www.thorlab)** - f = 150.0 mm, Ø1" Unmounted Visible Achromat, ARC: 400-700

56) 30 mm lens mount – for scan lens LMR30 NEED 1 1X$30

Adapters for the AL4532 to SM2

1. 1) Al4532 SM2 adapter and **AL4532 Retaining Ring.jpg – custom made – need to call Thor**

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 Total $3,892

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Newport Spectra - physics

Tel: 1-800-222-6440

Email: sales@newport.com

1) Universal base plate VP –BP NEED 1 X $130

2) Z stage VP25-XA 1 X $4000

3) Translation stage 2 axis 462-XY-M 1 X $900

4) 25 mm Travel Closed loop DC servo CMA actuator CMA-25CCCL 2 X $850

5) 3 axis controlles, display IEEE ESP300-111111 1 X $3700

6) Joystick (digital switchstick) ESP300-J 1 X $300

7) waveplate , zero-order half lambda, 905nm 10RP02-31 1 X $500

8) Rotation Stage, 1 inch aperture RSP-1T 1 X $200

9) polarizing beamsplitter 10FC16PB.5 1 X $350

10) holder for beamsplitter CH-1 1 X $200

11) mirror 10D20ER.4 4 X $100

12) clear aperture front load 2 actuators SN100-F2K 4 X $120

13) post SP-2 10 X $6

14) post SP-3 10 X $6

16) post holder VPH-1 10 X $12

17) post holder VPH-2 10 X $12

18) post holder VPH-3 10 X $12

19) base B-1A 5 X $10

20) base B-05A 5 X $10

21) rail carriage CXL95-50 1 X $100

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 Total $13,540

Uniblitz

Tel. 585-385-5930

1) Mecanical Shutter

VS14 opening time 1.5ms NEED 1 1 X $1,200

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Stanford Instruments

Phone (408) 744-9040

Fax (408) 744-9049

Email: info@thinkSRS.com

Low noise current amplifier SR570 NEED2 2 X $2000

http://www.thinksrs.com/products/SR570.htm

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 Total $4000

Alternatively, buy amplifiers from PICA, in Germany.

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Semrock

Here you should adjust the emission filters accordingly – This is designed for a green and a red channel, but if you were to use it for cfp and yfp, different filters would be needed. Also, the system can be designed for one pmt only as well, in which case you only need the laser blocking filter, not the emission filters. The laser block filter will start failing at 900nm.

Tel: 1-866-736-7625

http://www.semrock.com/Catalog/BrightlineCatalog.htm

1) Dichroic 2 inches diameter FF555-Di02-50 NEED 1 1 X $530

2) Green Emission Filter, 2 inches diam FF01-525/50 round, 50mm 1 X $1000

 FF01-510/84-50.8 - $1100

3) Red Emission Filter, 2 inches dia FF01-607/70 round, 50mm 1 X$1400

4) Laser Blocking Filter, 2 inches diam FF01-750/SP-50 NEED 1 1 X $1500

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 Total $4,420

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Chroma Technologies

Tel:1-800-824-7662

1) Dichroic - 2 inches diameter for 2p microscopy, 2.5 mm thick 680dcxr NEED 1 1 X $450

2) Excitation Filter - 1 inch diameter D480/20x NEED1 1 X $250

3) Emission Filter - 1 inch diameter HQ510DCLP NEED 1 1 X $250

4) Dichroic - 1 inch diameter 505dcxr NEED 1 200

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National Instruments

Tel: (888) 280-7645

Fax: 512-683-8411

1) BNC block BNC-2210 #777643-01 NEED 1 1 X $300

2) Input/Output Board 2 NI PCI-6110 \* #777475-01 NEED 1 1 X $3000

3) Shielded cable, 2m long SH68-68-EP #184749-02 NEED 1 1 X $120

 1 X $600

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\* there are much faster boards available if needed

 Total $ 3,420

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Optical Analysis Corporation

Andy Gerson

Olympus America, Inc

Microscopy Division

(Phone) 484-896-6244

(cell) 631-786-7046

andrew.gerson@olympus.com

objectives

1) 20X 0.95NA water objective, XLUMPLFL 20XW (1-UB965) NEED 1 1X $4500.00

OPTIONAL – only if you’re interested in other objectives. I only use the one above for 2p.

2) 4X Objective, 0.10 NA, air 1-U2C522 UPLanFlN 4X NEED 1 1 X $550

3) 10 X Objective, 0.3 NA, air 1-U2C524 UMPlanFL 10X 0.3NA NEED 1 1 X $990

4) 20 X Objective, 0. NA, air 1-U2C525 UPLFLN10XPH NEED 1 1 X $1100

5) 40X Objective, 0.8 NA, water 1-UM568 LUMPlanFL/IR (40XW) NEED 1 1 X $2340

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 Total $4,500

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OPTIONAL

Buy only if you want super bright epifluorescence, even brighter than a mercury lamp.

For a cheaper and convenient alternative (comparable in luminous flux to a xenon lamp), I’ve been using LEDs from Lumileds and the corresponding power supply.

Luminus Devices Inc (in fact buy from avnet.com)

Phone: +1 (978) 528-8000

Fax: +1 (978) 528-8001

1) CBT40 - blue (462 nm) need 1 1 X $55

2) Driver Kit need 1 (can drive from a PC three independent LEDs – adjust intensity and or frequency) 1 X $350

3) Power supply – recommended in the kit 1 X $300

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 Total ~$ 700

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CCD camera - good both for epifluorescence and infrared

VDS Vosskühler GmbH

Weisse Breite 7

D-49084 Osnabrück

Internet: www.vdsvossk.de

E-Mail: LKemper@vdsvossk.de

E-Mail: vds@vdsvossk.de

Tel.: +49 (0)541 / 80084-33

Fax: +49 (0)541 / 80084-10

1300-F QE CCD camera 33000e per well.................................................................$4100

OR

1300-F

33000 e per well CCD camera - differ in their spectral properties qe has higher qe in green than the other one

Currently, we are using this model:

CCD1300QF

1280 X 1024 pixels, 33000e/well, at most 25 fps, or 45 fps at 1280 X 512

resolution. Due to high QE in the green spectrum as well, this camera can also

be used for wide field fluorescence imaging. We do 4X4 spatial binning.

CABLE

cable to connect camera to framegrabber from dyneng.com

need to specify what are the things you want to connect -they custom make it for you .................$200

National INstruments Acquisition BOard

NI DAQ PCI1422 LVDS...................................................................................$1300

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Emcor

Tel:507-287-3535 or Tel: 507-287-3535

 Ray Perron Company, Inc.

 1040 Great Plain Ave.

 Needham, MA 02492

 Phone: 781-449-6162

 Fax: 781-444-1074

 www.rpc-inc.com

ALL THESE ITEMS BELOW MAKE 1 RACK.

This is what I ordered for my rig – obviously you can adjust it as needed.

Item Qty Part Number Customer P/N Description Unit Price Ext Price

1) 1 ICSFR-127A Vertical Frame, TX-BK Textured Black $616.00 $616.00

2) 1 MS-70 Mounting Straps, Intermediate $59.00 $59.00

3) 1 CXPN-2119 Bottom Panel Solid, TX-BK Textured Black $44.00 $44.00

4) 4 HW-401 Caster with Brake, HW401 - 4" Soft Rubber, Single Wheel, Swivel w/Brake (Each) $28.00 $112.00

5) 1 CXPN-2119 Top mounted 12U Filler Panel, Solid, Color: TX-BK Textured Black positioned at U1 $44.00 $44.00

6) 4 CSH-22A Internal mounted 2U Equipment Shelf, Solid, TX-BK Textured Black Finish positioned at U 4 $48.00 $192

7) 16 HW-092 10-32 Clip Nut $0.45 $7.20

8) 16 HW-103 10-32 Screw, 1-1/8" Long $0.30 $4.80

9) 1 WM-180615-PC 18" Power Strip, 15 Amp, w/Power Cord NEED 1 1 X $95.00

10) 1 CCSA-22C Pull-out Shelf, Solid $127.00 $127.00

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 Total: $1,300

 Estimated Freight Cost is $300.00

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 Grand Total = $1,600

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Cambridge Technology

Voice: (781) 541-1600

Fax: (781) 541-1601

contact person: David Freihofer dfreihofer@cambridgetechnology.com

1) Galvanometer Scanner model 6215HB NEED 2 2 X $500

2) Servo driver amplifier 671215H-1 NEED 1 1 X $500

3) Servo driver amplifies 671215H-1HP NEED 1 1 X $750

4) Interconnect Cable 6010-36-120 NEED 2 2 X $50

5) 3mm XY Mount for Scanner 61021503R60 NEED 1 1 X $200

6) 3mm XY mirror set for 6215H 6M2003S-S NEED 1 1 X $0

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 Total $ 2,550

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 "Power-One "Open Frame Linear" power supplies

Tel: (800) 576-6308,

Web: http://www.flw.com/powerone.htm Single

1) Linear power supply Model HE28-6-A 28V 6A Input Fuse 3A / 1.5A NEED 2 2 X $115

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 Total $230

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Mcmaster

(732) 392-6200

OPTIONAL – these are parts to build an optical cage around the microscope. You can do that also in much cheaper ways, perhaps less sturdy.

1) Hook and Loop Super adhesive velcro 94985K816 NEED 2 4 X $75

2) Lightweight Vinyl-Laminated Polyester Fabric

 54" Width, .013" Thick, 10 oz/SQ Yard, Black, 10'L 8831K733 NEED 3 3 X $25

3) Fractional T-Slotted Framing System

 1-1/2" X 3" Rectangular Extrusion, 8' L 47065T81 NEED 1 1 X $120

4) Fractional T-Slotted Framing System

 1-1/2" X 1-1/2" SQ Standard 4 T-Slot

 Extrusion, 8'L 47065T23 NEED 4 4 X $60

5) Fractional T-Slotted Framing System

 5 Hole Corner Connector for

 1-1/2" X1-1/2" Extrusion 47065T178 NEED 18 18 X $9

6) Acrylic Panels 36” X 48“, 0.213 thick - 8505K963 NEED 4 4 X $80

7) T-bolts – screws and nuts 47065T97 NEED 5 5 X $12

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 Total $1,277

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Lumileds Future Electronics

Tel: 662-536-0401 or 1-888-589-3662

1)LXHL-LB5C - blue LEDs - lambertian - centered at 470nm NEED 3 3 X$15

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 Total $45

I’ll provide the heatsink, thermal paste and holder. The power supply is the one from Fotronic – see below.

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Fotronic Corporation

Tel: (781) 665-1400

1) BK precision Power Supply DC regulated power supply - 3Amp, 30V, model 1626A NEED 1 1 X $250