



WIYN CONSORTIUM, INC.
950 N. Cherry Avenue • P. O. Box 26732
Tucson, AZ 85726-6732
(520) 318-8396

University of Wisconsin • Indiana University • Yale University • National Optical Astronomy Observatory

WIYN Consortium

Information for Potential New Partners

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Due to expected changes in the partnership, the WIYN Consortium is currently engaged in recruiting new members. This document provides updated information about the telescope and its instrumentation, and details three distinct ways for interested parties to gain access to observing time on the 3.5-m WIYN telescope.

Telescope & Instruments

Telescope: The WIYN 3.5-m telescope, completed in 1995, has long been recognized for its ability to produce superb images over a wide field of view. The median FWHM of stellar PSFs in images produced by WIYN is 0.65 arcsec. WIYN has proven to be a very robust and productive facility. In recent years the downtime due to technical issues has been under 1%

Instruments: WIYN currently supports a number of powerful instruments. These include:

pODI: Commissioning of WIYN's newest instrument, the partially-filled focal plane version of the One Degree Imager (pODI) was successfully completed in February 2013. Now in regular use, pODI is quickly becoming the workhorse imager at WIYN. The main imaging region covers a contiguous area of 24 x 24 arcmin on a side with 0.11" pixels. The WIYN consortium is currently pursuing an upgrade path to develop additional detectors for the ODI focal plane. Foundry runs for new detectors have taken place, and we expect to have an upgraded version of the instrument on the telescope by April 2015 that will have an unvignetted field of view of 40 x 40 arcmin.

Hydra: Hydra is a fiber positioner that can configure as many as 90 fibers for obtaining simultaneous multi-object spectroscopy. The effective FOV of Hydra is a circular field with a 1.0 degree diameter. Two different fiber bundles can be selected, with diameters on the sky of 2" and 3". The output end of the Hydra fibers feeds the **Bench Spectrograph**.

SparsePak: SparsePak is an Integral Field Unit (IFU) fiber bundle that also feeds the **Bench Spectrograph**. The fiber coverage includes a densely sampled inner core surrounded by a uniformly-distributed set of outer fibers; the instrument employs a total of 82 fibers, each with a diameter of 4.6 arcsec. The total area covered by the IFU is just under 2 arcmin square.

Bench Spectrograph: The “Bench” is the versatile, workhorse spectrometer at WIYN. It takes input from fiber feeds coming from either **Hydra** or **SparsePak**. It is highly configurable and can be used with a wide range of gratings, including a number of high dispersion and VPH gratings.

WHIRC: The WIYN High Resolution Infrared Camera (WHIRC) takes advantage of the superior image quality of WIYN to deliver excellent NIR images over a 3.3 arcmin square FOV. WHIRC holds up to 13 different filters at once, and is effective as both a broad-band (JHK) and narrow-band instrument.

Many of WIYN's instruments are of recent development. **WHIRC** was delivered and commissioned in 2008, a major upgrade to the **Bench Spectrograph** throughput was completed in 2008, and the **pODI** imager was commissioned in 2013. In addition, two new IFUs were delivered to WIYN last semester. Called **HexPak** and **GradPak**, these unique IFUs employ variable fiber sizes to provide a unique combination of spatial resolution and throughput for observations of galaxies. These new instruments, developed by Matt Bershady at Wisconsin, will also feed the **Bench Spectrograph**.

Full details about the telescope and instruments can be found on the WIYN web site: www.wiyn.org/About/wiyn.html

Two additional items are worth mentioning regarding instrumentation and observing at WIYN.

1) All of the instruments at WIYN can be used by observers operating remotely from their home institutions. This serves to reduce costs by eliminating travel and lodging expenses, as well as saving time. A large fraction of the observations currently carried out by consortium astronomers are done remotely. However, on-site observing will also continue to be supported. The WIYN Consortium rents a house on Kitt Peak from NOAO, and consortium members with scheduled observing runs are welcome to use “WIYN House” or stay in the NOAO dorms.

2) The WIYN and ARC consortia leaders have agreed in principle to a program of trading nights between the two groups. This program will allow members of the WIYN consortium to request nights on ARC to gain access to instruments that are not available on WIYN. In turn, ARC members will be able to request time on WIYN to use our unique instruments. The benefit of this program is obvious: it greatly expands the instrumentation and observing options for members of both consortia. Furthermore, it will reduce operations costs in the long run since the observatories will not need to duplicate expensive instruments at both sites. This is an example of the US Observatory System concept. The program may well be expanded in the future to other observatories.

WIYN Partnership Opportunities

The WIYN Consortium is offering potential partners three different ways to gain access to observing time on WIYN. The first is a traditional partnership, where the new partner pays a capital buy-in fee and effectively becomes an “owner” of part of the telescope. The second, that we are calling an “operational partner”, has lower up-front costs. This option can be thought of as a “rent to own” partnership, and may be a good way for potential partners to “test drive” the facility before making a long-term commitment. The third access path involves simply buying blocks of nights on the telescope. The latter option would only be relevant if there were nights available that the WIYN partners agreed to sell. Please note that the following descriptions of the Full and Operational Partner opportunities are intended to illustrate the general parameters for these options and should not be construed as a binding legal commitment by the WIYN Consortium. Precise details for admittance of Full or Operational Partners are subject to negotiation between prospective partners and WIYN.

Full Partner. An institution wishing to join the WIYN Consortium as a full partner will be expected to cover their fraction of the operations costs in proportion to their partnership level (i.e., a 20% partner would pay 20% of the annual operations costs). In addition, the institution will agree to pay a one-time capital buy-in fee. The level of this fee is set at their percentage partnership level times the \$15M estimated worth of WIYN (e.g., a 20% partner would pay a \$3M buy-in fee). A Full Partner would have full voting rights on the WIYN Board, and would be able to help shape the future plans of WIYN, participate in establishing annual operations budgets and help make instrumentation choices.

Example: An institution wishing to join WIYN as a Full Partner at the 20% level would pay a one time buy-in fee of \$3M, and agree to pay annual operations costs of ~\$400k/year (based on an assumed operations budget of \$2M/year in FY2015).

Operational Partner. An institution wishing to join WIYN, but not wishing to buy-in at the level of owning a piece of the facility, could join as an Operational Partner. An Operational Partner would not pay a buy-in fee. They would pay for their share of the operations costs, in proportion to their partnership level. In addition, they would pay an additional “infrastructure/development fee” set at 30% of their annual operations costs. This fee would be used to support improvements to the telescope and instruments, as well as supporting the general infrastructure of the observatory. If an Operational Partner decided to join the consortium as a Full Partner in the future, the amount of funds paid to the infrastructure/development fee would count towards their capital buy-in fee at that time. An Operational Partner would be expected to commit to a fixed-length partnership period of between 3 and 5 years. An Operational Partner would participate in the governance of the observatory with voice but no vote.

Example: An institution wishing to join WIYN as an Operational Partner at the 10% level would pay an annual fee of \$260k/year (based on an assumed operations budget of \$2M/year in FY2015). This would consist of their share of the operations (\$200k) plus the 30% infrastructure/development fee (\$60k).

Purchase Nights. WIYN will consider selling nights to interested parties who wish to carry out specific projects or simply get access to WIYN for a modest number of nights per semester. The cost per night will be set based on the widely-used NSF TSIP formula for estimating the cost of a night of telescope time. The cost per night could vary depending on lunar phase and season. Based on the TSIP formula, the base price for a night of WIYN time established in 2012 was set at \$13,600. The cost per night is expected to decrease slightly in the future as the operations budget for WIYN decreases (see below). For planning/discussion purposes it is safe to assume the above number, which should be close to the actual value of a night on WIYN.

Current View of the Future of WIYN & KPNO

The NSF Portfolio Review report has changed the landscape for astronomy on Kitt Peak. The proposed divestment in NOAO facilities by the NSF, including WIYN, is just one of several factors that we face as we move forward into the future. Since many of these issues are extremely relevant for potential partners in WIYN, we provide the following updates for your consideration. At the current time that there are still many uncertainties associated with these key issues. However, recent events suggest a path forward that leads to a positive future for telescope operations on Kitt Peak.

Mountain Infrastructure and Tribal Lease: At a meeting between Jim Ulvestad and Vern Pankonin of the NSF AST Division and representatives of the tenant observatories on Kitt Peak held March 26, 2013, it was announced that the NSF did not have any plans of to shut down the site. Rather, they pledged to make sure that Kitt Peak would continue to be available for use as a site for astronomical observations. Furthermore, they indicated that the NSF would ensure that the necessary mountain infrastructure would be maintained and operated, and that the lease with the Tohono O'odham would be honored and kept in force. This announcement removes a major stumbling block for the continued operation of WIYN and all other non-NOAO observatories on Kitt Peak.

Timescale of Yale and NOAO Divestment: Yale University has decided to leave the WIYN consortium, and formally withdrew at the end of March 2014. NOAO has notified WIYN that after the end of semester 2014B (January 31, 2015) that the NSF would no longer provide funds to support NOAO's partnership in WIYN.

New WIYN Partners: The University of Missouri has formally joined WIYN. They are joining as an operational partner starting in August 2014. Additional potential partners are currently discussing options for joining the consortium.

Expectations for WIYN Operating Costs: The members of the WIYN Consortium are currently expecting to operate WIYN independently of NOAO starting in 2015. With this target date in mind, we have initiated a planning exercise to revise our operations model as well as our costs. It is too early at this time to predict the outcome of this exercise. However, using the annual operations budgets of other similar-sized telescopes operating in the US as a guide, we expect that our annual budget will be in the neighborhood of \$1.5M to \$2.0M in 2015. We are using these numbers as the basis for our current partnership discussions. It is worth stressing that these numbers are only approximate at this time.