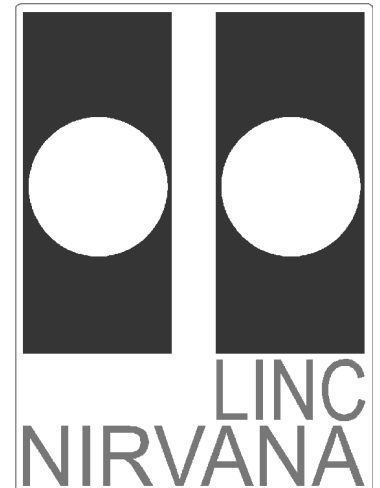


# LINC-NIRVANA

The **L**BT **I**nterferometric **C**amera and  
**N**ear-**I**nfra**R**ed / **V**isible **A**daptive  
**i**nterferometer for **A**stronomy

A collaborative project of the MPIA Heidelberg, INAF-Arcetri,  
Universität zu Köln, and MPIfR Bonn

<http://www.mpia.de/LINC>



## LINC-NIRVANA

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### External Requirements

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## Document Change Record

Issue	Date	Section/ Paragraph Affected	Reasons / Remarks
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## 1 Scope

This document lays out the high level external requirements for the LINC-NIRVANA instrument. This essentially means requirements from the LBT Observatory itself. Note that there are separate, but related, documents laying out the high-level requirements related to science and technical issue, and to operations and maintenance.

## 2 Applicable documents

No.	Title	Number & Issue
1	LINC-NIRVANA Preliminary Design Review	N/A
2	Science-Technical Requirements	LN-MPIA-FDR-GEN-003
3	Operations / Maintenance Requirements	LN-MPIA-FDR-GEN-004
4	Assembly, Integration, and Testing Plan	LN-MPIA-FDR-AIT-002
5	Implementation, Commissioning, and Acceptance: Plans and Procedures	LN-MPIA-FDR-AIT-006

## 3 External Interfaces

Item	Short description
Not applicable	

## 4 Acronyms and abbreviations

AO	Adaptive Optics
GWS	Ground-layer wavefront sensor
HW	Hardware
IR	Infrared
LBT	Large Binocular Telescope
LBTO	Large Binocular Telescope Observatory
MCAO	Multi-conjugated adaptive optics
MHWS	Mid-high layer wavefront sensor
NGS	Natural Guide Stars
PDR	Preliminary Design Review
SW	Software

## 5 Introduction

LINC-NIRVANA is a complicated instrument with a substantial number of high-level requirements. In this document, we lay out the external requirements. These relate mostly to the Observatory itself. As a strategic instrument, LINC-NIRVANA receives LBTO support, although at this time, the formalities of this have not yet been negotiated. Related documents, LN-MPIA-FDR-GEN-003 and LN-MPIA-FDR-GEN-004, deal with scientific and operations requirements, respectively.

## 6 External Requirements

Note: Some of these requirements also appear in LN-MPIA-FDR-GEN-003. For further details, refer to section 10 of LN-MPIA-FDR-AIT-002 (“Assembly, Integration, and Testing Plan”).

### 6.1 General

Item	Requirement
Instrument Type	Near-IR Fizeau imaging interferometer LBT Strategic Instrument (defined in LBT Board Book 29 July 2000) Option to become a facility instrument to be negotiated within LINC-NIRVANA consortium between this group and the LBT Observatory.

### 6.2 Technical Requirements

Item	Requirement
Focal Station	“Permanent” mounting at the rear, shared focal station (closest to visitor’s gallery).
Floor Load	At least 7 tonnes in instrument prep area distributed as on telescope. At least 1 tonne in all areas used to transfer and handle the cryostat.
Cooling lines	Gaseous helium cooling lines (supplied by LINC-NIRVANA) to be installed between level 4 cooling unit and the rear shared focal station.
Pointing Model	Custom LINC-NIRVANA pointing model, including coordination of both optical trains.

### 6.3 Support Requirements

Item	Requirement
Routine operation	Personnel required for routine operation: telescope operator, telescope software specialist.
Installation	Personnel required for installation: telescope operator, telescope software specialist, telescope engineer, crane operator.
Commissioning	Personnel required for commissioning: telescope operator, telescope software specialist, AO scientist

### 6.4 Infrastructure Requirements

Item	Requirement
Instrument Prep Area	At least 7 (w) x 7 (d) x 4.5 (h) meters. Particulars to be negotiated. . See Services Requirements below for Instrument Prep Area services.
Clean Prep Area	At least 4(w) x 3(d) x 3 (h) meters. Class 1000. Particulars to be negotiated.
Cooling equipment on Level 4	Main unit: At least 2m x2m x 2.5 m high. Buffer 2m x 2m Access to crane hatch. Weight: approximately 1.5 tonnes See Services Requirements below for Level 4 services.
Cryo cooler lines	Supplied by LINC-NIRVANA, installed by LBTO between level 4 and the central instrument platform Flexible, 80 mm diameter

### 6.5 Services Requirement

Item	Requirement
On-telescope	Ethernet, Water-Glycol, Power, Dedicated Fibers - see LN-MPIA-FDR-GEN-007 (“Services”)
Instrument prep area	Ethernet, Water-Glycol, Power, Dedicated Fibers - see LN-MPIA-FDR-GEN-007 (“Services”)
Level 4	Ethernet, Water-Glycol, Power, Dedicated Fibers - see LN-MPIA-FDR-GEN-007 (“Services”)
Remote presence	Mobile Polycom videoconference unit that can be moved to the instrument platform, prep area, etc.

## 6.6 Control Room Requirements

Item	Requirement
Terminals	2 keyboards + 4 wide screens routine operations additional 5 ports during commissioning
Computers	Approximately 1/2 cabinet (10U) in control room computer annex
Dedicated Fibers	As laid out in LN-MPIA-FDR-AIT-002
Remote presence	Polycom videoconference unit in control room for remote consulting.

## 6.7 Handling Requirements

Item	Requirement
Crane	Access to rear, shared focal station for 7 tonnes Access to edge of Visitor Gallery for 1 tonne (cryostat)

## 6.8 Accommodation Requirements

See also LN-MPIA-FDR-AIT-006 (“Implementation, Commissioning, and Acceptance: Plans and Procedures”)

Item	Requirement
Commissioning	Accommodation for up to 15 team members
Routine observations	Accommodation for 5 team members initially, dropping to 3 team members during steady state.