

1120 After the installation for the VirtualBox or other virtualisation software a
1121 and virtual machine should be created. The recommended parameters of
1122 the virtual machine are at least 40 Gb of virtual HDD, 1Gb of RAM and a
1123 virtual DVD drive. The details of the virtual machine creation depend on
1124 the particular software used for this purpose.

1125 To install a customised CentOS operating system an installation image
1126 should be downloaded from MPP DPHEP storage <https://zeus-files.mpp.mpg.de/software>
1127 The installation starts automatically after booting from it. The system with
1128 appropriate ZEUS environment will be ready for the usage after the end of
1129 installation process and reboot, however, some network configuration tuning
1130 might be needed.

1131 After those operations it will be possible to login to the virtual. The
1132 relevant username/password pairs are stored on the DVD disk in `ks.conf`
1133 file, for the current release they are: `root DPHEP` and `zeus zeusdp`.

1134 In addition, various ssh clients might be used to access the virtualised OS
1135 remotely, e.g. openssh or Putty SSH agent [119]. For the VirtualBox installa-
1136 tion it will be available on 127.0.0.1, port 100XX (see for details in `ks.conf`
1137 file on the installation image). The X forwarding support (i.e. graphics)
1138 will depend on the actually installed software (e.g. XWin32 for Windows
1139 systems).

1140 10.5. Cloud computing

1141 As of 2015 several opportunities exist for the cloud computing. The most
1142 promising model for a long term, scale-able analysis opportunity are these
1143 that provide Infrastructure as a service (IaaS).

1144 11. Documentation preservation.

1145 The main efforts to preserve the digital and paper documentation of the
1146 ZEUS experiment were conducted in DESY.

1147 11.1. Digital documentation.

1148 Concepts for long-term preservation of the ZEUS digital documentation
1149 are being worked out in collaboration with the DESY IT division and library,
1150 e.g. based on the INSPIRE system and/or centrally maintained web servers.

1151 As of 2016 most of the ZEUS internal notes and reports are available on
1152 INSPIRE¹⁶

1153 *11.2. Non-digital documentation.*

1154 ZEUS also maintains an extensive archive of non-digital information. This
1155 archive includes all ZEUS notes written before 1995, transparencies presented
1156 at meetings before 2000, technical drawings and many other things. Most of
1157 this archive has already been moved to its final destination, hosted by the
1158 DESY library. It is being consolidated, partially digitised, and catalogued
1159 taking advantage of the know-how available in the DESY library. At the end
1160 of 2012 custody of this archive is fully handed over to the DESY library.

1161 *11.3. New documentation.*

1162 In some cases it might be useful to update the ZEUS documentation or
1163 add some missing parts. To add a new documentation on the existing ZEUS
1164 documentation, the best way is to make it publicly available or, if not possible
1165 contact the ZEUS spokesperson.

1166 **12. Future of the collaboration**

1167 The aim of this section is to give an overview of the tasks which are seen
1168 for the ZEUS Collaboration, and to propose a structure able to fulfil these
1169 tasks.

1170 *12.1. Tasks*

- 1171 • Communicate the ZEUS/HERA results to the scientific community and
1172 to the general public, encourage their use, and monitor their proper
1173 citation.
- 1174 • Assure that ongoing analyses, as well as the combination of H1 and
1175 ZEUS data are completed expeditiously and also documented in high
1176 quality publications and presentations at conferences and workshops.
- 1177 • Assure that the access to the ZEUS data and analysis tools is kept
1178 in a running order and the necessary expert knowledge on ZEUS is
1179 preserved and made available also to new analysers of ZEUS data.

¹⁶ZEUS login and password are needed

- 1180 • Encourage future analyses and assure that they are completed and lead
1181 to high quality presentations and publications. This includes maintain-
1182 ing a list of interesting ongoing and possibly future analyses and of the
1183 ZEUS experts able and willing to help in these analyses.
- 1184 • Assure the communication within the ZEUS Collaboration.
- 1185 • Assure a close contact with the DESY management, the DESY sci-
1186 entific review committees (Physics Research Committee and Scientific
1187 Council) and the ZEUS Collaboration.
- 1188 • Encourage the use of HERA/ZEUS data for educational purposes.
- 1189 • Coordinate the planning of the resources required to achieve these
1190 tasks, and help in finding the necessary support.
- 1191 • If requested, help individual ZEUS institutes to acquire resources for
1192 the support of analyses of ZEUS data.

1193 12.2. *Structure*

1194 A team consisting of the Spokesperson, the Physics Chair who also acts as
1195 Deputy Spokesperson, Physics Coordinators and the Head of the Technical
1196 Support Team will manage the ZEUS Collaboration. The task distribution
1197 outlined below should be considered as a guideline. **The ZEUS Collabora-**
1198 **tion** comprises all scientists and students active in ZEUS, either by perform-
1199 ing or by supervising analyses, by contributing to the discussion of ZEUS
1200 publications and presentations, or by fulfilling other important tasks and
1201 responsibilities within the Collaboration. The members of the ZEUS Collab-
1202 oration have to review and actively confirm their membership yearly. Each
1203 ZEUS Institute nominates a Contact Person. The Institutes Contact Per-
1204 sons are responsible to name the members of their Institute according above
1205 guidelines for ZEUS membership. The members of the ZEUS Collaboration
1206 are the authors of the ZEUS publications. In addition, persons who are not
1207 members of the ZEUS Collaboration can be authors of a ZEUS publication if
1208 they have contributed significantly to this particular publication. **The Con-**
1209 **tact Persons of the ZEUS Institutes** are nominated by the individual
1210 institutes of the ZEUS Collaboration. They perform communication between
1211 ZEUS and his Institute, assure that analyses done in his Institute are properly
1212 supervised, participate in the Election of the Spokesperson as outlined below.
1213 **The Spokesperson** carries the overall responsibility for the ZEUS Collabo-
1214 ration. He represents the Collaboration within the scientific community and
1215 DESY. The list of tasks, which he together with his team is expected to fulfil,
1216 is given under (2). At least once a year, the Spokesperson will organise a

1217 ZEUS Collaboration Meeting. Terms of office: 2 years with the possibility of
 1218 reelection Nomination of Candidate(s): At least half a year before the end
 1219 of his term of office, the current Spokesperson installs, in consultation with
 1220 the Contact Persons, a Nominating Committee. The Nominating Committee
 1221 nominates the candidate(s) for the election. Election: Vote by the Members
 1222 of the ZEUS Collaboration, with a membership of at least 1 year at the time
 1223 of the vote. The candidate, who obtains the simple majority (+1) of the cast
 1224 votes, is elected. **The Physics Chair** is a member of Physics Coordinators,
 1225 described below, and chairs the discussion of Physics Coordinators. The
 1226 Physics Chair serves at the same time as the ZEUS Deputy Spokesperson.
 1227 Terms of office: to be agreed between Spokesperson and person concerned
 1228 (should be at least 6 months) Appointment: Spokesperson and Physics Co-
 1229 ordinators in consultation with the Contact Persons

1230 **Physics Coordinators** are 2 – 4 ZEUS members, responsible for the
 1231 different physics subjects of ZEUS, with the tasks to

1232 follow the physics analyses in their physics domain and organise regular
 1233 discussions, in consultation with the Spokesperson setup Editorial Boards to
 1234 scrutinise analyses and assure a high quality of the publications, help the
 1235 Spokesperson maintain a running list of ongoing and future analyses, help
 1236 students interested in an analysis find a supervisor for this analysis, interact
 1237 with the Leader of the Technical Support Team on requirements and prob-
 1238 lems arising from the physics analyses in their domain. Terms of office: to be
 1239 agreed between Spokesperson, Physics Chair and person concerned (should
 1240 be at least 6 months) Appointment: Spokesperson and Physics Coordinators
 1241 in consultation with the Contact Persons

1242 **The Technical Support Team** consists of the Data Preservation Team
 1243 supported by DESY and ZEUS institutes, which assures a running and ef-
 1244 ficient analysis infrastructure and interacts with the Spokesperson and the
 1245 Physics Coordinators on related issues. DESY IT group takes care of main-
 1246 taining the necessary IT infrastructure for the ZEUS analyses and ZEUS
 1247 communication according to the current needs. It is one of the tasks of
 1248 the Spokesperson to regularly update the corresponding planning and com-
 1249 municate the resources required to the Contact Persons and to the DESY
 1250 Management.

1251 *12.3. Role of DESY, the ZEUS Host Laboratory*

1252 DESY, as the ZEUS Host Laboratory, will continue to play a special role.
 1253 In particular:

- 1254 • There will be regular contacts between the Spokesperson and the DESY
1255 management to inform the Collaboration about developments at DESY,
1256 and to inform the DESY management on the results from the Collab-
1257 oration, on its status and planning. On request, the Spokesperson will
1258 provide the DESY management with the data needed for the reports
1259 for DESYs funding agencies and similar documentations.
- 1260 • All official ZEUS Publications will be submitted to the DESY manage-
1261 ment for approval.
- 1262 • The DESY PRC will continue to monitor the progress of ZEUS and
1263 advise both DESY and the ZEUS Collaboration.
- 1264 • DESY will assure the technical support and the DESY IT support,
1265 which runs the IT infrastructure required for ZEUS analyses and com-
1266 munication. The needs will be reviewed at the regular meetings be-
1267 tween DESY and the Spokesperson.
- 1268 • DESY will provide the infrastructure which allows Scientists, which
1269 come to DESY for ZEUS related matters, to work efficiently. This
1270 includes a conference system for meetings via internet.

1271 *12.4. Role of member institutes*

1272 **13. Access rules**

1273 An important issue in the context of the data preservation is the data
1274 access. The access rules for the ZEUS data as of 2016 in the data preservation
1275 mode are similar to these during the active phase of the collaboration [120]
1276 and the rules of other experiments for the preserved data [121]. A participant
1277 from an institute (see Section C.1) not in ZEUS may be allowed access to
1278 ZEUS data for a period up to 2 years with possible extensions under the
1279 following conditions.

- 1280 • The participant may be either a PhD candidate or a PhD physicist.
- 1281 • One of the ZEUS institutes undertakes to sponsor this participant.
- 1282 • The sponsoring institute and the participant (and the PhD supervisor
1283 in case of a PhD candidate) outline the planned participation and sub-
1284 mit it to the spokesperson of ZEUS. The plan should, in general, lead
1285 to a physics publication.
- 1286 • The proposal is accepted by the spokesperson.
- 1287 • The participant will be, as a rule, listed as author under the sponsoring
1288 institute for the ZEUS papers produced during the defined period of
1289 participation. Any paper which significantly benefits from the work

- done by the participant will also have him/her as an author regardless of when it is published. This authorship rights may be different depending on the degree of involvement in ZEUS proposed.
- The work done by the PhD candidate during his/her visit to ZEUS may form a part of his/her PhD thesis.
- More generally it is foreseen that the following rules will be applied:
- The requests for an access to the ZEUS data for any purposes should be made through the acting spokesperson.
 - The acting spokes has a right to deny the request in case it is against the interest of ZEUS or the science in general.
 - Access to the archived ZEUS data will only be authorised to non-former ZEUS collaborators in collaboration with one or more former “expert” members.
 - The publications resulting from the use of preserved ZEUS data will have to be co-signed by the at least eight ZEUS members including the acting Spokesperson.
 - An editorial board should be formed to consider the approval of the results for a publication. The minimal number of the members is three.

14. Summary

The Data preservation project for the ZEUS experiment has multiple levels and many participants. The presented work described the implementation of the data preservation for the ZEUS experiment.

Acknowledgements

We thank the staff of the MPCDF and DESY IT departments who provided computing resources and support for the data storage. We kindly thank the institutions still providing the computing resources for the experiment. We appreciate the contribution of Janusz Malka and other ZEUS members to the preservation of ZEUS data. We appreciate the work of thousands people who made the experiment possible and contributed to the physical results.

We thank the authors of the ZEUS Primer web page that contains a lot of material that was used in the preparation of this article.